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Assigning Grammatical Gender to Novel Nouns in L1 and L2 Spanish

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ASSIGNING GRAMMATICAL GENDER TO NOVEL NOUNS IN L1 AND L2 SPANISH

A Dissertation Presented

by

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DEDICATION

To Odin, Adalia, and Travis.

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ABSTRACT

ASSIGNING GRAMMATICAL GENDER TO NOVEL NOUNS IN L1 AND L2 SPANISH

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Grammatical gender is an inherent lexical property of nouns that categorizes them into two or more classes. Spanish and Portuguese have a binary gender system in which all nouns are masculine or feminine; this, along with number produces morphosyntactic agreement relationships between nouns, determiners, and adjectives. Conversely, when it comes to morphosyntactic agreement, English only produces agreement for number. The feature distinctions between Spanish and Portuguese on the one hand and English on the other can be illustrated using type hierarchies in HPSG, where the gender feature in Spanish and Portuguese has the same distribution in the hierarchy, whereas the gender feature in English is limited to animate referential contexts. The aim of this dissertation is to analyze how L1 and L2 Spanish speakers assign, retain, and process novel noun gender taking into account their L1 typology. L1 Spanish speakers, L1 BP speakers, and L1 English speakers participated in three experimental tasks that manipulate novel noun gender and morphophonological shape. The first task presents speakers with 18 short stories, introducing two of the same novel item, differing along a single attribute, indicated by a gender-inflected adjective. Participants respond to a question about each story, necessarily producing the nonce noun and adjective. The second task is a description task after every six stories to investigate participants' gender retention. The third task investigates processing with a Self-Paced Reading paradigm where reading times are collected for nonce nouns and an anaphoric null nominals. The results indicate that all three speaker groups assign gender differently. L1 Spanish and L1 BP speakers rely most heavily on syntactic cues to assign gender, but L1 BP speakers rely more heavily on

morphophonological cues than L1 Spanish speakers. L1 English speakers rely most heavily on morphophonological cues on the nonce noun. All speakers have more difficulty assigning feminine gender compared to masculine gender. This is taken to be due to the unmarked status of the masculine gender and suggests that Spanish gender feature values are [±fem] rather than masculine/feminine. These results also suggest that a theory of feature reassembly may more adequately describe the SLA process, accounting for prolonged instances of non-target optionality.

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LIST OF ABREVIATIONS

L1	First Language
L2	Second Language
SLA	Second Language Acquisition
UG	Universal Grammar
MDG	Minimal Default Grammar
IL	Interlanguage
HPSG	Head-driven Phrase Structure Grammar
BP	Brazilian Portuguese
SPR	Self-Paced Reading
TM	Transparent Masculine morphology condition
TF	Transparent Feminine morphology condition
NM	Neutral Masculine morphology condition
NF	Neutral Feminine morphology condition
DM	Deceptive Masculine morphology condition
DF	Deceptive Feminine morphology condition

CHAPTER 1

INTRODUCTION

Grammatical gender is a linguistic phenomenon that is an inherent property of nouns (Corbett, 1991), classifying them into two or more categories. These categories produce agreement effects on other word classes, such as on determiners, quantifiers, and adjectives (Real Academia Española, 2010, p. 81). This research investigates the assignment, retention, and processing of this feature by native and non-native Spanish speakers through data obtained from three experimental tasks. Many studies in second language acquisition indicate that L2 speakers that do not possess grammatical gender in their L1 have substantial difficulties in producing the target gender forms (Franceschina, 2001b; McCowen and Alvord, 2006; Montrul, 2008) and some even argue that grammatical gender is unacquirable beyond the critical period if it is not present in the L1 input (Hawkins, 1998, 2009; Franceschina, 2005). Conversely, errors by L2 speakers who do possess grammatical gender in their L1 are often attributed to *confusion* between their L1 and the L2 (White et al., 2004), however, to the author's knowledge, there are no studies that explicitly test this assertion.

This research has several distinct aims. The first is to examine the role that language typology of the speaker's L1 plays in assigning, retaining, and processing

grammatical gender. To do so, the tasks employ the use of nonce (i.e., *invented*) nouns. This eliminates the possibility of attributing non-target gender responses to confusion between the L1 and the L2. This also eliminates the variable of frequency of exposure in the task. Many studies on gender involve words that exist in Spanish (Hawkins, 1998; Franceschina, 2001a, 2005; White et al., 2001; Bruhn de Garavito and White, 2002; White et al., 2004; Montrul et al., 2008), which raises the issue of how familiar a speaker is with the test items. The second goal is to investigate the linguistic factors that facilitate target gender assignment and retention and expedite anaphoric gender processing. To this end, the experimental items manipulate the gender of the determiners and modifiers that enter into agreement relations with the novel nouns as well as the morphophonological shape of the nonce noun itself. Thirdly, this research employs innovative experimental techniques designed to more closely simulate a speaker's experience the first time they encounter an unfamiliar word, which aims to contribute to data collection methods in the field of Second Language Acquisition (SLA).

More broadly, this research aims to contribute to the debate as to the nature and representation of SLA as well make contributions to a theoretical analysis of the acquisition process. In the field of SLA there has been a great effort over the years to develop a theory that can explain the development path of second language (L2) learners (White, 1985, 1989; Eubank, 1993; Hawkins and Chan, 1997; Prévost and White, 2000; Liceras, 1997; Travis, 2008; Lardiere, 2009b; Roeper, 2011; Amaral and Roeper, 2014). The emergence of the Principles and Parameters theory (Chomsky, 1981b) initially held great promise for SLA researchers due to the deductive consequences predicted to arise from bundled feature values (Hyams, 1986; Baker, 1996; Snyder, 2001). However, decades of research regarding in both L1 and L2 acquisition has yet to definitively define specific parameters, launching debates about macro- and microparameters (Rizzi, 1982, 2005; Kayne, 1984, 2005; Baker, 1996) and ultimately

leading to concerns about whether these parameters provide enough theoretical potency as to be useful to either the researcher or the language learner (Baker, 1996; Lightfoot, 1997; Travis, 2008; Lardiere, 2008, 2009b).

The aspect of language acquisition that tends to be more widely agreed upon among linguists is that *features* play a prominent role (Chomsky, 1965, 1981a, 2005; Hawkins and Chan, 1997; Franceschina, 2002; Travis, 2008; Liceras, 2009; Lardiere, 2009a,b). Features have been discussed as the base component in linguistic theory dating back at least five decades when Chomsky (1965) published *Aspects of the Theory of Syntax*. Whether they be phonological, formal, or semantic, features are, according to Lardiere (2009b), 'the primitive elemental units that make up the lexical items of every language, and the differences between languages are due to differences among these features' (2009, p. 173). If we take this to be true, then the study of language acquisition is necessarily the study of the acquisition of features (Travis, 2008, p. 23).

After the emergence of the Principles and Parameters framework (Chomsky, 1981a,b), much of the L2 research focused on whether L2 learners were able to acquire features of the L2 that they did not possess in their L1. The research conclusions that resulted from this work can be essentially divided into two camps: (1) the deficit camp and (2) the full access camp. Those within the deficit camp argue that there is a fundamental difference in the way that L2 learners acquire language and that due to critical periods in brain development, beyond a certain age, a person's access to Universal Grammar is restricted, necessarily resulting in non-target-like systems (Bley-Vroman, 1990; Tsimpli and Roussou, 1991; Hawkins and Chan, 1997; Hawkins, 2009). On the other hand, those coming from the full access perspective maintain that L2 learners theoretically can become fully native-like in their L2; however, they may fail to do so due to various reasons such as lack of sufficient exposure or not noticing a

difference between their L1 and their L2 (Schwartz and Sprouse, 1994, 1996; Amaral and Roeper, 2014).

In the pursuit of better understanding how new features are acquired, grammatical gender has often been the subject of study in many investigations in Second Language Acquisition as its existence is parametric, existing in some languages, while not in others (Hawkins, 1998; White et al., 2001; Bruhn de Garavito and White, 2002; White et al., 2004; Hawkins and Franceschina, 2004; Franceschina, 2005; Carroll, 1999, 2005). However, the expression of grammatical gender is far more complex than a yes or no switch, as Kirova (2016, p. 3) states:

> Gender is not a purely syntactic feature, but rather an interface feature that is represented morphologically, syntactically and lexically; hence, its acquisition should hinge on a number of factors, not exclusively the (un)availability of the UG.

Therefore, the task of an L2 learner acquiring a gendered language when their L1 does not have gender is not simply to integrate the gender feature as part of their linguistic representation but also to learn how gender is assigned to a noun and what are the other linguistic elements that enter into agreement relations with the noun. Additionally, L2 learners must determine which gender feature takes precedence when there is a clash between grammatical gender and semantic gender. The complexity of this feature makes it an ideal object of study in order to focus on feature acquisition, assembly, and reassembly as the basis for a theory of second language acquisition. As such, the final objective of this research, is to further investigate the ideas put forward by Lardiere (2008, 2009b) on feature assembly as the focus of L2 acquisition theory. To this end, this research employs the constraint-based approach Head-driven phrase structure grammar, HPSG (Pollard and Sag, 1987, 1994; Sag et al., 2003) as a framework to formalize a theory of feature (re)assembly as suggested by Carroll

(2009), which allows us to investigate features from the typological level of feature selection down to the level of feature expression on individual lexical items.

This research investigates the assignment and retention of grammatical gender and the employment of agreement relations as a point of departure specifically because grammatical gender is an exceptionally complicated phenomenon. To that end, the study compares three speaker groups: native Spanish speakers; L1 Brazilian Portuguese (BP) / L2 Spanish speakers; and L1 English / L2 Spanish speakers. When it comes to grammatical gender, BP and Spanish are typologically nearly identical. English, on the other hand, only has a semantic notion of gender which is used referentially on third person pronouns. Thus, the prediction is that BP speakers have no need to reconfigure the gender feature in their IL representation; whereas L1 English speakers have to first establish the new feature in their representation and then determine its distribution. HPSG provides a framework in which languages are hierarchically organized by their features and how those features are expressed. These hierarchical structures make it possible to make performance predictions based on structural similarities and differences between languages.

Contrary to the predictions of this study, as well as previous research and assumptions (Hawkins, 1998; White et al., 2004; Montrul et al., 2008), native Spanish speakers are susceptible to producing non-target gender responses, particularly in feminine conditions where gender is not overtly morphologically marked. Also contrary to our predictions, BP speakers do not perform like L1 Spanish speakers in every condition; L1 BP speakers rely more heavily on morphophonological gender cues than their L1 Spanish counterparts do. L1 English speakers, however, do generally perform as expected, assigning gender based on the morphophonological shape of the nonce word above all other cues. This dissertation explains these results in

depth as well as the myriad of implications accompany them, touching on issues of grammatical productivity and conservatism.

1.1 Thesis Outline

This dissertation is organized into seven chapters. After this first chapter of introduction, Chapter 2 offers a discussion of grammatical gender and nominal agreement in Spanish, Portuguese, and English as well as a general overview of research done in first (L1) and second (L2) language acquisition of the phenomenon. Chapter 3 provides a description of the syntactic framework used in this research, Head-driven phrase structure grammar (HPSG) and its treatment of nominal agreement in Spanish, Portuguese, and English. The following chapter, Chapter 4, reviews the role of features over the last several decades in linguistic theory and ends with a proposal for a theory of feature reassembly formalized by HPSG. The methodology for the three tasks conducted as part of this research is presented in Chapter 5 along with a detailed presentation of the coding schema used in each. The results of these tasks are presented in Chapter 6 with preliminary analyses. Finally, this dissertation concludes with Chapter 7, which presents a discussion of the results detailed in Chapter 6 and the conclusions drawn from this research and additionally suggests future directions in line with the current research.

CHAPTER 2

GRAMMATICAL GENDER

Gender as a grammatical category is an inherent lexical property of nouns that classifies them into two or more gender classes and is part of a native speaker's linguistic competence (Corbett, 1991, 2006). Grammatical gender can be categorized along different criteria and is not present in all languages (e.g., English, Japanese, Finnish). Languages like Arabic, Hebrew, and most Romance Languages have a binary masculine-feminine gender system. Other binary gender systems classify nouns by a *common/neuter* distinction (e.g., Danish, Norwegian) or *animate/inanimate* (e.g., Basque and many Native American languages such as Dakotan or Hopi). Languages such as Russian, German, and Sanskrit have a tertiary masculine-feminine-neuter gender system. The determining criterion of gender is agreement; therefore, a language that has a binary gender system has two classes of nouns that are distinguished syntactically by the agreement relationships they enter into (Corbett, 1991, p. 4).

The value of this agreement feature on a noun may or may not be explicable in semantic terms (Corbett, 2006, p. 126). Some languages have predominately semantic assignment systems for gender in which the meaning of a noun is sufficient to deter-

mine its gender. Other languages have formal systems that drive gender assignment. Within this category, some languages, such as Russian, assign gender of [-animate] nouns by their morphology.[1] Languages like French (and to a lesser extent Spanish and Portuguese) have more opaque gender systems whereby there exists a correlation between the phonological form of some nouns and a particular gender; however, this is simply a correlation and not a reliable indicator of nominal gender (Corbett, 1991, 2006). It is important to stress here that while in some languages biological sex may be expressed via grammatical gender, grammatical gender is a category that is separate from semantic gender. That is to say, that while in Spanish the word for 'table' (*mesa*) may be grammatically feminine, there are no properties of the table in which it could be considered feminine as a social or biological construct.

The work presented here in this dissertation investigates feature assembly and reassembly in first and second language speakers by comparing the assignment, production and processing of grammatical gender in native Spanish speakers and in L2 learners with gender in their L1 and without, those being L1 Brazilian Portuguese (BP) and L1 English speakers, respectively. This chapter discusses the phenomenon of nominal agreement in Spanish, Portuguese, and English and examines what is known about the acquisition path of gender in L1 and L2 learners.

2.1 Grammatical Gender in Spanish

Spanish, like many Romance Languages, has a binary gender system in which all nouns and pronouns are grammatically classified as either feminine or masculine, this property produces agreement effects with determiners, adjectives, quantifiers, and occasionally other word classes (Real Academia Española, 2010).

[1]See Corbett (1991, pp. 34-43) and Corbett (2006, p. 129) for examples and discussion.

In designating gender to a novel noun, speakers can utilize noun external distributional properties, such as the agreement paradigm, as well as noun internal distributional properties, characteristics of the noun that fall into a particular noun class, such as morphology or semantics (Gagliardi, 2012). This section discusses the internal and external distributional properties of noun gender in Spanish: semantic, morphophonological, and syntactic.

In the realm of noun internal distributional properties we see that grammatical gender for animate nouns (and particularly nouns with human referents) often, though not always, corresponds with the biological gender of the referent (Sera et al., 2002), as illustrated in table 2.1.

Masculine	**Feminine**
El hombre (*the man*)	La mujer (*the woman*)
El amigo (*the (male) friend*)	La amiga (*the (female) friend*)
El estudiante (*the (male) student*)	La estudiante (*the (female) student*)

Table 2.1: Noun Gender in Spanish

Additionally with animate nouns we see that gender can either be expressed lexically, in which the gender is an inherent property of the lexical item (as in the case of *hombre/mujer*); morphologically, in which the base lexeme is the same (in this case *amig-*) and then the appropriate morpheme (-o / -a) is added to form the fully specified gendered noun; or syntactically, in which the lexical item itself is invariable and the grammatical gender of the noun is construed through agreement relations with other linguistic elements, such as determiners and adjectives (Ambadiang, 1999a).

Although most [+ animate] nouns express grammatical gender that is consistent with their biological gender, there is a small class of nouns known as *epicene* nouns that refer to [+ animate] entities with a single grammatical gender that applies to referents of both biological sexes. The majority of these nouns are animals (e.g., *la*

comadreja 'the weasel', *el búho* 'the owl'); to specify the biological sex of the animal the terms *macho* 'male' or *hembra* 'female' may be added, as in example (1).

(1) La comadreja macho vio la comadreja hembra.
The$_{fem}$ weasel$_{fem}$ male saw the$_{fem}$ weasel$_{fem}$ female
The male weasel saw the female weasel.

Masculine	**Feminine**
El personaje (*the character*)	La persona (*the person*)
El bebé (*the baby*)	La víctima (*the victim*)
El miembro (*the member*)	La visita (*the visitor*)

Table 2.2: Spanish Epicene Nouns

An exceptionally small class of epicene nouns can be used with human referents. Examples of such words are found in Table 2.2. These nouns do not take the gender clarification terms *macho* 'male' and *hembra* 'female' but rather, the biological sex of the referent must be determined through contextual cues. Additionally, as indicated in Table 2.2 the word *bebé* (baby) is grammatically masculine; therefore, a sentence like (2) can refer to an infant of either biological sex.

(2) **El** bebé está enferm**o**.
The$_{masc}$ baby is ill$_{masc}$
The baby is ill.

Nevertheless, *la bebé* is sometimes heard in reference to a baby girl (Butt and Benjamin, 2013), illustrating that even though prescriptive grammatical standards state that *bebé* is always masculine, regardless of the biological sex, variability among dialects or individual speakers may still exist in this domain.

Inanimate nouns also have an inherent gender; however, gender for inanimate nouns is assigned rather arbitrarily and their semantic classification of gender is much more idiosyncratic and complex than that of animate nouns (Ambadiang, 1999b, p. 4851). Grammatical gender is often reflected in the morphophonological

shape of the word for both animate and inanimate nouns; there are strong correlations for nouns ending in *-o* with masculine gender and *-a* with feminine, as well as other correlations, such as *-ción* or *-dad* with feminine gender or *-dor* and *-aje* with masculine gender (Teschner and Russell, 1984).

Morphology provides an important cue to determine the gender of a noun when syntactic cues are not present. Not only are nouns that end in *-o* strongly correlated with masculine gender (99.9%) and those ending in *-a* strongly correlated with feminine gender (96.3%), according to Teschner and Russell (1984), but these morphological markers are also productively used to distinguish gender in many animate referents (e.g., niñ**o** = boy; niñ**a** = girl; perr**o** = male dog; perr**a** = female dog); in the diminutization of nouns, regardless of whether the base form itself ends in one of these vowels (e.g., el refresco ⇒ el refresqu**ito**; el café ⇒ el cafec**ito**; la cerveza ⇒ la cervec**ita**; la leche ⇒ la lechec**ita**) (Alcina Franch and Blecua, 1975; Colina, 2003; Real Academia Española, 2010; Ambadiang and Bergareche, 2012); and in the inflection of many adjectives, as illustrated in examples (3) and (4) below.

(3) La tarta es muy ric**a**.
The$_{sg.fem}$ cake$_{sg.fem}$ is very delicious$_{sg.fem}$
The cake is very delicious.

(4) El bizcocho es muy ric**o**.
The$_{sg.masc}$ cake$_{sg.masc}$ is very delicious$_{sg.masc}$
The cake is very delicious.

Although it is true that many nouns conform to these canonical gender endings, there are many words that do not have a clear morphophonological marking for gender. Nouns ending in *-e* are not strongly associated with either gender, illustrated in table 2.3. While there are some morphophonological forms ending in *-e* that are highly indicative of masculine gender (e.g., *-aje*) and others that correspond strongly with feminine (e.g., *-umbre*), there are also many letter clusters easily take both gen-

ders (e.g., *-ente*, *-ave*, *-eve*). Of the 1,000 most-frequent lexical nouns, there are 24 that end in *-e* and from this these 24, two-thirds (16) are feminine, though masculine nouns ending in *-e* dominate feminine nouns on the whole (Teschner and Russell, 1984, p. 124).

In addition to inanimate nouns ending in *-e*, there are a large number of animate nouns ending in *-e* that can take either masculine or feminine gender, depending on the sex of the referent (e.g., *el/la agente* 'agent', *el/la descendiente* 'descendant', *el/la cantante* 'singer', *el/la estudiante* 'student', *el/la rebelde* 'rebel', *el/la jinete* 'jockey') (Real Academia Española, 2010).

masculine	**feminine**
El puente (*the bridge*)	La fuente (*the fountain*)
El coche (*the car*)	La noche (*the night*)
El envase (*the container*)	La base (*the basis*)
El relieve (*the relief*)	La nieve (*the snow*)
El té (*the tea*)	La fe (*the faith*)
El frente (*the front*)	La frente (*the forehead*)

Table 2.3: Spanish nouns ending in -e

There are some morphological forms ending in *-e* that are highly indicative of masculine gender (e.g., *-aje*) and others that correspond strongly with feminine (e.g., *-umbre*), however, many letter clusters easily take both genders (e.g., *-ente*, *-ave*, *-eve*). Of the 1,000 most-frequent lexical nouns, there are 24 that end in *-e* and from this these 24, two-thirds (16) are feminine, though masculine nouns ending in *-e* dominate feminine nouns on the whole (Teschner and Russell, 1984, p. 124). In addition to inanimate nouns ending in *-e*, there are a large number of animate nouns ending in *-e* that can take either masculine or feminine gender, depending on the sex of the referent (e.g., *agente* 'agent', *descendiente* 'descendant', *cantante* 'singer', *estudiante* 'student', *rebelde* 'rebel', *jinete* 'jockey') (Real Academia Española, 2010).

Outside the realm of nouns, we see the gender-ambiguous status of the *-e* morphology in adjectives as those that end in -e are invariable when it comes to gender. Therefore, while these adjectives still form an agreement relationship with the noun they modify, this is not marked by a morphophonological inflection on the adjective, as illustrated in examples (5) and (6).

(5) La tarta es muy grand**e**.
The$_{sg.fem}$ cake$_{sg.fem}$ is very big$_{sg.inv}$
The cake is very big.

(6) El bizcocho es muy grand**e**.
The$_{sg.fem}$ cake$_{sg.fem}$ is very bigsg.inv
The cake is very big.

When it comes to other noun endings, we see that *-d* also has a strong association with the feminine gender (97.6%) and letters like *-n* and *-z* have a slight tendency to be feminine (51.6% and 61.4%, respectively). Nouns ending in *-l* or *-r* are strongly associated with masculine gender (97.9% and 98.6%, respectively) and those ending in *-s* have a slight tendency toward masculine (*57.3%*). It is important to note, however, that simply looking at the last letter of a word does not necessarily provide the most accurate information. In the case of nouns ending in *-n*, it would seem from the overall data that a noun is almost as likely to be masculine as it is to be feminine; however, nouns ending in *-ción* or *-sión* are overwhelmingly feminine.

We can see from the distribution of masculine and feminine gender that the morphology of a noun *can* be highly associated for gender and provide a solid basis of predictive power; however, we also see that every morphophonological form, no matter how strongly it is associated with a particular gender, is not impervious to exceptions, even in the case of *-o* (which has a 99.9% association with masculine gender) we find cases like *la mano* 'the hand', *la foto* 'the photo', and *la testigo* 'the (female) witness' (Teschner and Russell, 1984).

Morphosyntactic agreement relations provide the strongest and most reliable cue for determining the grammatical gender of a noun in Spanish, and most specifically the agreement relationship with the determiner. However, even this agreement relationship in Spanish is not 100% reliable. For phonological reasons, feminine nouns that begin with a tonic *a-* or *ha-* take a masculine determiner in the singular form, as in *el agua* (the$_{masc}$ water$_{fem}$), *el águila* (the$_{masc}$ eagle$_{fem}$), or *el hambre* (the$_{masc}$ hunger$_{fem}$). In these cases, one can look to agreement relations with inflected adjectives (examples 7 and 9) or to the plural form (example 8) to establish to proper target gender of these nouns.

(7) El agua fría
The$_{sg.masc}$ water$_{sg.fem}$ cold$_{sg.fem}$
The cold water

(8) Las águilas
The$_{pl.fem}$ eagles$_{pl.fem}$
The eagles

(9) El hambre extrema
The$_{sg.masc}$ hunger$_{sg.fem}$ extreme$_{sg.fem}$
The estreme hunger

The possessive determiner can also be uninformative when it comes to gender in Spanish. Unlike English, Spanish possessive determiners enter into agreement relationships with the noun that is possessed, rather than with the possesser; however, first, second, and third person singular possessive pronouns inflect only for number, not for gender. The only possessive determiners that inflect for gender are the first person plural and the second person informal plural (found only in the Peninsular Spanish dialect).

Singular Possessive	**Plural Possessive**	**English Equivalent**
Mi	Mis	My
Tu	Tus	(informal) Your
Su	Sus	His / Her / Their / Your
Nuestro	Nuestros	Our (masc)
Nuestra	Nuestras	Our (fem)
Vuestro	Vuestros	(informal plural) Your (masc)
Vuestra	Vuestras	(informal plural) Your (fem)

Table 2.4: Spanish possessive determiners

With the data provided here in this section, one can see that it is possible to form Noun Phrases that are essentially devoid of any cues that indicate the grammatical gender of the noun, as in example (10).

(10) Tu juguete verde
Your$_{inv}$ toy green$_{inv}$
Your green toy

In this case, both the determiner and the adjective are invariable in terms of gender and the noun itself has no phonological cues that would point strongly to masculine or feminine gender. When it comes to learnability, a speaker would have to wait for further input to conclusively determine whether the noun *juguete* is feminine or masculine.

In summation, when it comes to Spanish, the agreement relation between the noun and the determiner provides the most reliable gender information, though there are cases where the determiner is not informative (i.e., singular possessive determiners) or is even deceptive (i.e., feminine nouns beginning with tonic *a-* or *ha-*). Other agreement relations, such as with inflected adjectives provide reliable cues for noun gender as well, but we see that there are many adjectives that do not inflect for gender. In the cases where the noun gender is not present in agreement relationships, the morphophonological shape of the word can be indicative of noun gender as there is a strong association for gender with certain noun endings, although, again, there are

exceptions. Finally, in the case of [+animate] nouns, grammatical gender often corresponds with the referent's biological sex; however, the case of epicene nouns (e.g., *la víctima* (the$_{fem}$ victim); *el personaje* (the$_{masc}$ character)), which have an inherent gender that does not vary according to biological gender of the referent, illustrates that biological gender of an animate referent is not reliably indicative of grammatical gender. Therefore, it can be concluded that in Spanish there is no single cue that can reliably point a speaker to the appropriate target gender of a noun 100% of the time.

2.2 Grammatical Gender in Portuguese

Portuguese, like Spanish and many other Romance languages, has a binary masculine-feminine gender system. When it comes to grammatical gender, Spanish and Portuguese behave quite similarly. Grammatical gender agreement in Portuguese can be observed in the morphology of determiners, adjectives, participial forms, pronouns, and occasionally with other word classes (Name, 2002; Corrêa and Name, 2003). Grammatical gender for animate nouns, especially for people and domesticated animals, is strongly associated with the biological sex of the referent, as illustrated in table 2.5.

masculine	**feminine**
O homem (*the man*)	A mulher (*the woman*)
O amigo (*the (male) friend*)	A amiga (*the (female) friend*)
O estudante (*the (male) student*)	A estudante (*the (female) student*)

Table 2.5: Noun Gender in Portuguese

Here we see that, like Spanish, grammatical gender of animate nouns in Portuguese can be expressed lexically (e.g., *o homem / a mulher*); morphologically (e.g., *o amigo / a amiga*); or syntactically (*o estudante / a estudante*).

Most nouns (approximately 95.5%) in Portuguese have intrinsic grammatical gender, which is to say that the gender of the noun is constant (Rocha, 1981, p. 26). In this category we find all nouns with a [-animate] feature value, such as *o leite* (the milk$_{masc}$) and *a casa* (the house$_{fem}$), as well as a select class of epicene nouns, such as *a criança* (the child$_{fem}$) or *o ídolo* (the idol$_{masc}$).

A subset of [+animate] nouns inflect for gender so that the grammatical gender is consistent with the biological gender of the referent. In these cases, the endings *-o* or *-e* (reduced medium vowels [ʊ] and [ɪ]) alternate with the ending *-a* to mark masculine and feminine gender, respectively, as in the case of *bibliotecário* (male librarian) and *bibliotecária* (female librarian) or *cachorro* (male dog) /*cachorra* (female dog). For nouns ending in other letters, generally the *-a* ending is affixed to the base form (e.g., *professor* (male professor) / *professora* (female professor); *peru* (male turkey) / *perua* (female turkey)). Rocha (1981) and Corrêa and Name (2003) suggest that gender inflection on Portuguese nouns consists of the morphologically productive ending *-a*, which opposes the masculine form *-ø*. In essence, masculine nouns are the unmarked (default) form of gender inflected nouns, in cases where the unmarked form ends in *-o* or *-e*, the adjunction of the feminine gender morpheme occludes the thematic vowel, resulting in distinctions such as *o moço* (the young man) / *a moça* (the young lady) or *o presidente* (the (male) president) / *a presidenta* (the (female) president).

For other [+animate] nouns, grammatical gender conforms to the biological gender of the referent; however, the noun itself does not undergo inflection, particularly with nouns ending in *-ante* or *-ista* (e.g., *estudante* (student); *artista* (artist)). In these cases, the gender of the noun is expressed through agreement relations with the determiner (and possibly other word classes like adjectives and pronouns).

Much like Spanish, there is a correlation between the morphophonological shape of the noun and its gender. Most nouns ending in the thematic vowel *-o* are

masculine while most nouns ending in the thematic vowel *-a* are feminine. As nouns that end in the thematic vowels *-o* and *-a* have the same morphophonological form as the gender inflections *-o* and *-a*, an associative pattern can be established between the *-o* ending for masculine nouns and the *-a* ending for feminine nouns (Corrêa and Name, 2003, p. 23). Additionally, and also like Spanish, the *-o* and *-a* endings are morphologically productively used to inflect the gender of adjectives, as illustrated in examples (11) and (12) below.

(11) A barra de chocolate é muito gostos**a**.
The$_{sg.fem}$ bar$_{sg.fem}$ of chocolate is very delicious$_{sg.fem}$
The chocolate bar is very delicious.

(12) O bolo é muito gostos**o**.
The$_{sg.masc}$ cake$_{sg.masc}$ is very delicious$_{sg.masc}$
The cake is very delicious.

This productive morphology marking provides additional strength to the association of *-o* and *-a* endings with masculine and feminine genders, respectively. However, not all adjectives inflect for gender. Adjectives ending in *-e* or a consonant are invariable for gender, as in *contente* (glad) or *feliz* (happy).

In comparing Portuguese noun gender with Spanish, we have seen up to this point that the gender systems in these two languages are very similar. There are, however, difficulties that L1 speakers of these languages encounter when learning the other. Specifically, many nouns have a different grammatical gender when translated into the other language; these cases are known as heterogeneric nouns, that is to say they are not comparable or of different genera (Moreno and Eres Fernández, 2007; Fioravanti, 2015). In some instances, the differences are systematic; for example, the nominal suffix *-aje* in Spanish is masculine; whereas in Portuguese, the related suffix *-agem* is feminine, as illustrated in Table 2.6.

Spanish	**Portuguese**
El viaje (*the voyage*$_{masc}$)	A viagem (*the voyage*$_{fem}$)
El lenguaje (*the language*masc)	A linguagem (*the language*$_{fem}$)
El mensaje (*the message*$_{masc}$)	A mensagem (*the message*$_{fem}$)

Table 2.6: Heterogeneric Nouns ending in *-aje* / *-agem*

Other heterogeneric nouns show no systematic change between Spanish and Portuguese; in some cases the word's translation is a perfect cognate, whereas in others the words are not phonetically related.

Spanish	**Portuguese**
La sal (*the salt*$_{fem}$)	O sal (*the salt*$_{masc}$)
La nariz (*the nose*$_{fem}$)	O nariz (*the nose*$_{masc}$)
El origin (*the origin*$_{masc}$)	A origem (*the origin*$_{fem}$)
La miel (*the honey*$_{fem}$)	O mel (*the honey*$_{masc}$)
El humo (*the smoke*$_{masc}$)	A fumaça (*the smoke*$_{fem}$)
El cuchillo (*the knife*$_{masc}$)	A faca (*the knife*$_{fem}$)

Table 2.7: Heterogeneric Nouns in Spanish and Portuguese

When it comes to determiner-noun agreement relationships, Portuguese provides more reliable gender information than Spanish. As mentioned in the previous section, Spanish is not well inflected for gender in its possessive determiners. Portuguese, on the other hand, has a rich inflectional system for both number and gender in its possessive determiners, as illustrated in Table 2.8 below.

Singular Possessive	**Plural Possessive**	**English Equivalent**
Meu	Meus	My (masculine)
Minha	Minhas	My (feminine)
Teu	Teus	(informal) Your (masc)
Tua	Tuas	(informal) Your (fem)
Seu	Seus	His / Her / Their / Your (masc)
Sua	Suas	His / Her / Their / Your (fem)
Nosso	Nossos	Our (masc)
Nossa	Nossas	Our (fem)

Table 2.8: Portuguese possessive determiners

Additionally, Portuguese does not have any phonological rules that cause masculine determiners to be used in place of feminine ones. Feminine nouns that begin with a tonic *a-* take the feminine determiner as with any other feminine noun (e.g., *a água* (the$_{fem}$ water$_{fem}$)). It is perhaps this regularity that can explain why in Portuguese grammatical gender agreement appears in child speech before number agreement, unlike Spanish and many other languages with morphosyntactic gender and number agreement (Hooper, 1980).

In sum, Portuguese and Spanish have a grammatical gender system that is nearly identical. In both languages, there are three essential factors that can aid a speaker in determining the gender of a noun: (i) morphosyntactic agreement relationships with other linguistic elements; (ii) morphophonological shape of the word; and (iii) biological gender of the referent (for [+animate] nouns). There is a strong and productive phonological association for gender and, in both Spanish and Portuguese, the noun ending *-o* is highly correlated with masculine gender and *-a* is highly associated with feminine gender; although we easily find exceptions to this tendency in both languages (e.g., *la mano* (the hand$_{fem}$, Spanish); *o planeta* (the planet$_{masc}$, Portuguese)). Additionally, grammatical gender for nouns that are [+animate] in both languages often (but not always) is associated with the biological gender of the referent. In both languages we find that morphosyntactic relations with determiners provide the most reliable gender cues for nouns; more so for Portuguese than for Spanish due to the inflection of possessive determiners and Spanish's phonological rule that places masculine determiners in relation with feminine nouns beginning with a tonic /*a*/.

2.3 Gender and Agreement in English

Old English possessed a tertiary masculine-feminine-neuter grammatical gender system; however, Middle English experienced a heavy loss of inflections in which the grammatical gender system nearly disappeared completely (Curzan, 2003, p. 12). The remnants of this gender system persist in personal singular pronouns (e.g., *he, she, it*), which is used to distinguish male animate referents, female animate referents, and inanimate referents (Asher, 1994, p. 1125). Additionally, a handful of nouns maintain a masculine-feminine distinction in morphology (e.g., god-godess, duke-duchess, lion-lioness, bachelor-bachelorette).

When it comes to gender, English has a referential agreement system in which [+animate] nouns may show forms of referential agreement in the pronominal system.

(13) The waitress$_i$ burned herself$_i$.

(14) The King$_j$ greeted his$_j$ subjects.

(15) Every bachelorette$_k$ gets a free drink when she$_k$ arrives.

Gender in English is specified on some [+animate] nouns, either through the addition of a feminine morpheme, such as *-ess* (e.g., princess, waitress, actress) and, to a lesser extent, *-ette* (e.g., bachelorette, usherette, geekette) or as an inherent lexical property (e.g., girl, queen, mother). In some of the English nouns inflected for gender, many speakers allow the masculine form to take female referents as well, as illustrated in examples (16) and (17); however, this is not always the case, as demonstrated by the infelicitous phrase in (18).

(16) The waiter$_i$ burned herself$_i$.

(17) The actor$_j$ forgot her$_j$ lines.

(18) * The duke$_k$ wore her$_k$ favorite hat.

Additionally, inflected feminine forms in English can never take male referents and nouns that are lexically specified for gender must enter into referential agreement relationships with a referent that matches their gender specification (Danesi, 2016).

(19) * The waitress$_i$ burned himself$_i$.

(20) * The boy$_j$ broke her$_j$ arm.

(21) * The lady$_k$ lost his$_k$ hat.

A large class of [+animate] nouns are invariable when it comes to gender and can take either male or female referents (e.g., *student, employee, member, person*). However, while there are many nouns that are invariable and able to take referents of both genders, there may be a strong bias for the word to take a masculine (e.g., *surgeon, pilot, farmer*) or feminine (e.g., *nurse, receptionist, nanny*) referent (Sturt, 2003).

As illustrated in the examples above, gender in English is a feature of referential agreement that is rooted in semantic distinctions of biological sex. Unlike Spanish and Portuguese, gender in English produces no agreement effects in the local domain (i.e., within the DP); though, when it comes to morphosyntactic agreement, English does produce agreement effects in the local domain for number. Even so, morphosyntactic agreement in English is much weaker than in Spanish and Portuguese as only a handful of determiners are marked for number and adjectives in English are invariable. Some determiners, such as the definite determiner, *the* in English are not marked for number, as illustrated in examples (22) and (25) and possessive determiners agree with the possessor rather than the possessed item, as in (24) and (25).

(22) The happy dog barks.

(23) The happy dogs bark.

(24) My happy dog barks.

(25) My happy dogs bark.

Other determiners, such as the indefinite and demonstrative determiners are inflected for number, as illustrated below.

(26) This dog barks.

(27) These dogs bark.

(28) A dog barks.

(29) Some dogs bark.

Although there are only a select few determiners that still possess this number distinction in English, this is not an indication that number agreement within the Noun Phrase is not strong. Phrases like **These dog* or **A dogs* are completely ungrammatical in English and by the age of three, children acquiring English are able to produce proper nominal agreement relations (Ingham, 1998; Corbett, 2006).

English, like Spanish and Portuguese, does have morphosyntactic agreement in the Noun Phrase and possesses gender agreement for [+animate] nouns. However, gender is not a feature of morphosyntactic agreement as it is in Spanish and Portuguese and does not exist as a feature on [-animate] nouns, with the exception of cases of personification or metonymy (Wechsler, 2013). Gender in English is a property that exists as referential agreement feature that is present solely on nouns and pronouns, while Spanish and Portuguese have gender as a feature, not only of referential agreement on nouns and pronouns, but also as a morphosyntactic agreement feature which produces agreement effects on a large class of linguistic elements, such as determiners, adjectives, and quantifiers.

2.4 Gender in L1 Acquisition

In the realm of first language acquisition, what has emerged from the majority of studies on the acquisition of grammatical gender is that it is one of the earliest grammatical properties to emerge and in many cases to be mastered, although there is some variation here between languages depending on the complexities in the gender system (Corbett, 1991, p. 83). Gender typically begins to be marked around roughly 2 years of age when the child has mean length of utterance (MLU) of roughly two morphemes (Müller, 1994).

Research in first language acquisition has found that Spanish-speaking monolingual children have mastered gender agreement within the noun phrase with nearly 100% accuracy by the age of three (Hernández-Pina, 1984; López-Ornat, 1997; Snyder et al., 2001). Research with L1 Portuguese children has found that gender distinctions develop before number distinctions, unlike in Spanish L1 acquisition (Hooper, 1980). There has been some argument that gender agreement is not only acquired early in the L1 acquisition process, but it is acquired with very few errors (Schnell de Acedo, 1995; Franceschina, 2005). However, other research has indicated that the child undergoes a period in the acquisition process whereby they make different types of agreement errors (Hernández-Pina, 1984; López-Ornat, 1997; Mariscal, 2009).

Mariscal (2009) argues that while L1 learners do seem to acquire grammatical gender more easily when compared to L2 learners, that the process may not be as straightforward as other researchers have claimed. There is evidence that agreement with definite determiners is the first type of agreement to be mastered, followed by agreement with other classes of articles (Hernández-Pina, 1984; López-Ornat, 1997). Mariscal (2009) suggests that children are able to master nominal agreement with definite determiners before anything else precisely because these determiners are so abundant in the input. Corrêa and Name (2003) observe that children as young as two

years old inject inflected adjectives into their speech, for which they suggest that the computation of agreement within the DP takes place beyond the Determiner-Noun relationship, allowing adjectives to be inflected as soon as they are incorporated into the child's speech. This is to suggest that perhaps agreement with determiners appears before other forms of agreement simply because Determiner-Noun combinations are produced very early in child language development. However, other evidence from L1 Portuguese acquisition suggests that before gender distinctions are made, children employ the masculine singular form of the adjective is usually, though not always, used in all contexts (Stoel-Gammon, 1976; Hooper, 1980).

When children produce errors, it is often a case of overgeneralization of the unmarked (i.e., *default*) masculine gender for feminine forms (Hooper, 1980; Hernández-Pina, 1984; Pérez-Pereira, 1991; Meisel, 1994; López-Ornat, 1997) or instances of regularization when it comes to gender. For example, in corpus data children have been found to employ feminine agreement with a masculine noun ending in the feminine canonical ending *-a*, as in **la fantasma* (the$_{fem}$ ghost$_{masc}$) (López-Ornat et al., 1994).

Lleó (1997) suggests that these errors made by young L1 speakers are the result of performance errors, rather than a lack of agreement features. Lew-Williams and Fernald (2007) conducted an eye-tracking study to test very young children's (2;8-3;5) ability to use grammatical gender to facilitate word recognition. Children were presented with pairs of pictures that either had the same gender (e.g., *la pelota* (the$_{fem}$ ball) / *la galleta* (the$_{fem}$ cookie)) or different genders (e.g., *la pelota* / *el zapato* (the$_{masc}$ shoe)) and listened to a directive referring to one of the items (e.g., *Encuentra la pelota* 'Find the ball'). Children reacted faster on the different gender trials in which the determiner is more informative than on trials where both items shared the same gender. The results indicate that Spanish speaking children who only produce approximately 500 words are already able to employ the information on

gender-marked articles to establish reference and indicates that children do, in fact, have knowledge of the feature values of high frequency nouns.

When children do commit errors in gender agreement at young ages, the majority of the errors are not arbitrary, but rather result from lexical and morphological complexities in the gender system generally resulting from conflicting information in the gender assignment cues (Karmiloff-Smith, 1979; Pérez-Pereira, 1991; Müller, 1994; Corrêa and Name, 2003). As previously alluded to in sections 2.1 and 2.2, researchers generally identify three possible sources of information that learners can rely on during the acquisition process for a language like Spanish: (i) semantic cues, namely biological gender, such as in the nouns found in (1); (ii) morphological cues, such as *–o* or *–a* to denote masculine and feminine, respectively; and (iii) syntactic cues, seen in agreement relations between determiners and modifiers (Karmiloff-Smith, 1979; Pérez-Pereira, 1991; Corrêa and Name, 2003; Franceschina, 2005; Mariscal, 2009). The literature for both L1 and L2 acquisition indicates that learners do not rely on these cues to the same extent, showing variation based on developmental stage, type of learner, and language that is being acquired (Corbett, 2006; Gagliardi, 2012).

Studies with nonce words in French (Karmiloff-Smith, 1979), Spanish (Pérez-Pereira, 1991), and French-German bilingual (Müller, 1994) speaking children have found that young children (up to roughly age 5) rely most heavily on the morphophonological shape of a word to determine its gender, after age five, children begin to shift their strategy, relying more heavily on the value of the determiner to assign gender to a novel noun regardless of its morphophonological form. Results in Spanish show that young children treat nouns ending in *-o* as masculine and those ending in *-a* as feminine, regardless of the gender of the determiner (Pérez-Pereira, 1991). Conversely, results from nonce studies in Brazilian Portuguese speaking children (Corrêa and Name, 2003) indicate that children do not initially rely on a morphophonological

strategy to assign noun gender. Instead, Corrêa and Name (2003) argue that initially it is necessary for children to identify the gender of nouns by processing agreement in the DP in order for a correlational pattern to be established between the morphophonological form of the noun and grammatical gender. Children, however, do not heavily utilize semantic associations when establishing noun gender (Karmiloff-Smith, 1979; Pérez-Pereira, 1991; Pinker, 1995) and in languages like English where gender is purely semantic and only manifests itself on pronouns and certain [+animate] nouns, children struggle more in forming target agreement than children whose target language possesses a rich, morphosyntactic gender system (Corbett, 1991). However, Alarcón (2009) argues that semantic gender of a [+animate] referent does facilitate gender agreement in L1 acquisition when it is present, even though it may not be a primary cue for gender assignment.

When it comes to grammatical gender in L1 acquisition, we see that cross-linguistically, children acquire this feature quite early and with relative ease. Gender agreement between determiners and nouns is the earliest form to be mastered; however, agreement with adjectives appears to be highly accurate from the moment that adjectives are introduced into a child's speech. Children rely heavily on morphophonological and syntactic cues in order to assign gender and beyond the age of five syntactic cues emerge as the most reliable indicator of noun gender. When children do commit gender errors, it is generally due to irregularities in the gender system that result in conflicting gender cues. In these cases, they are most likely to overgeneralize the unmarked masculine form or regularize the gender of nouns with non-canonical gender endings.

2.5 Gender in L2 Acquisition

Unlike first language acquisition, the acquisition of grammatical gender in the second language is characterized as difficult and highly variable. Adult L2 Spanish speakers notoriously exhibit problems in the acquisition of grammatical gender and these problems persist even at highly advanced stages of proficiency (Bruhn de Garavito and White, 2002; White et al., 2001, 2004; McCowen and Alvord, 2006; Montrul et al., 2008). However, there are some similarities in the acquisition path of L1 and L2 gender acquisition: gender acquisition with inanimate nouns occurs later than with animate nouns and both L1 and L2 speakers tend to be less accurate with them (Hernández-Pina, 1984; Fernández-García, 1999). The extensive differences when it comes to the development of gender agreement and ultimate attainment between L1 acquisition and L2 acquisition has made this the subject of a great deal of research into the L2 acquisition process and how it differs from L1 acquisition.

Much of the research that has been done on the acquisition of gender in SLA has been conducted from a generativist perspective. Under current analysis (Chomsky, 1995, 2001), gender and number are considered φ features that are found lexically determined on the head noun with a feature [±feminine], which is an interpretable feature on nouns and an uninterpretable, or formal feature on adjectives and determiners, which must enter into a checking relationship with corresponding features elsewhere in the structure. Others have proposed that gender and number are functional categories in the determiner phrase above the noun phrase, as illustrated in Figure 2.1.

According to Carstens (2000), nouns appear in the syntactic tree as the head of the NP and already have an interpretable gender feature. In English the noun exhibits covert movement for number agreement due to weak feature strengths. In languages like French or Spanish, the noun will overtly raise to the agreement phrase

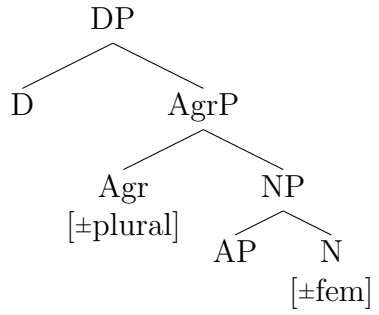

Figure 2.1: Minimalist syntactic representation of grammatical gender

(AgrP) due to strong features, which give these languages their typical N-Adj word order in the DP, and then covertly raise to D where it checks uninterpretable features in specifier-head (Adj-N) or head-head (Det-N) relations. Though gender is lexically assigned to the noun, gender agreement in languages like Spanish and Portuguese is considered to be a syntactic feature-checking operation carried out by the syntax (White et al., 2004; Montrul et al., 2008). In addition, gender is parameterized, which is to say, it is realized in some languages but not in others and therefore has been a phenomenon studied in the debate of whether or not L2 learners are able to reset parameters (Hawkins, 1998; Bruhn de Garavito and White, 2002; White et al., 2004).

Under the assumption that gender is a parameterized syntactic feature governed by Agree operations, it has been studied extensively to determine whether or not it is available to the L2 learner if it is not activated in the L1. Some researchers argue that L2 speakers' continual struggles with gender agreement provides evidence that L2 speakers are unable to acquire formal features that are not present in their L1 beyond the critical period (Hawkins, 1998; Franceschina, 2001a,b, 2005; Hawkins and Franceschina, 2004) in line with the Failed Functional Features Hypothesis (FFFH) (Hawkins and Chan, 1997) and the Representational Deficit Hypothesis (Hawkins, 2009).

In a spontaneous production study with 30 advanced L1 English learners of French, Hawkins (1998) found that subjects showed almost perfect N-Adj order within French DPs. In contrast, the situation in regard to gender features showed that there were problems with gender agreement between articles (both definite and indefinite) and nouns. Hawkins takes these findings as evidence that L2 speakers are able to change the strength of a feature present in their L1 (in this case, number) to allow the adjectives to raise to Agr, but they are unable to acquire features that are not present in their L1 (in this case, gender). Franceschina (2001b) investigates naturalistic data from a highly proficient L2 Spanish speaker (L1 English) and finds that of his errors in nominal agreement, 93% are errors of gender agreement, while only 7% are errors in number agreement, which she argues as evidence for critical period effects, as English has morphosyntactic number but not gender. In an analysis of spontaneous production data of a highly proficient L2 Spanish speaker (L1 English), Franceschina (2001b) also argues for a representational deficit perspective based on the observed contrast between number errors and gender errors, with the latter being more problematic. Franceschina (2001a) further supports this perspective with data collected in a study on L2 gender acquisition with six L2 Spanish speakers, three of whom were L1 English speakers and three of whom were L1 Italian speakers. She found that the L1 English participants produced gender concord less accurately than the L1 Italian counterparts.

There are, however, some issues to be addressed in these studies and their analyses. First, an example of a gender error in Franceschina's study is **una sistema* (a_{fem} system_{masc}), however, this is clearly a case of regularization, which has been cited in the literature as a typical step in L1 development (López-Ornat et al., 1994). Additionally, Italian and Spanish both evolved from Latin, and as such have a gender agreement system that is very similar, so much so that the Italian translation for *un sistema* (a_{masc} system_{masc}) is exactly the same, *un sistema* (a_{mas} system_{masc}).

Second, Franceschina (2001b) attributes the dramatic difference between gender and number error rates to critical period effects; however, this analysis ignores the fact that *number* has a semantic distinction (singular vs. plural) that *gender* very often does not (with the exception of animate referents). Finally, another issue with much of the data that is used to suggest that L2 learners are unable to acquire the gender feature is that accuracy rates in these studies are generally above 75%, regardless of whether the learner has gender in their L1 or not (Franceschina, 2001b, 2005; Hawkins and Franceschina, 2004; Dussias et al., 2013; among others). The gender error rates in the spontaneous production data that Franceschina (2001b) used to support the deficit perspective were between 85% and 92%. This is spontaneous production data, which means with a two-gender system that chance is at 50%; with error rates between 8% and 15% that leaves a large gap between performance and chance. In order to perform at levels so much greater than chance, L2 speakers must be employing grammatical gender constraints in production. This evidence suggests that L2 speakers can and do acquire the gender feature; however, for various reasons perhaps due to uncertainty about a noun's gender or production errors there are still non-target gender forms produced in their speech.

Bruhn de Garavito and White (2002) noted that Hawkins (1998) only tested a group whose L1 did not have a grammatical gender feature. Therefore, they conducted a study on the acquisition of grammatical gender in Spanish by L1 French speakers and compared these results with those of Hawkins and found that the French speakers exhibited similar problems to English speakers when it came to gender agreement, suggesting that the absence of gender in the L1 is not the only factor that affects L2 gender acquisition. While the Bruhn de Garavito and White (2002) study certainly provides evidence that L2 speakers who have gender in their L1 do make errors in agreement, it is unclear in the analysis if L1 English and L1 French speakers have similar problems with agreement. In their data analysis, Bruhn de Garavito and

White separate agreement results into two general categories: gender on determiners and gender on adjectives; however, they do not analyze the noun phrases in their entirety. That is to say, while French and English speakers may show roughly equal error rates in gender agreement, we cannot know if they are making the same types of errors.

White et al. (2004) also conducted a study investigating gender and number agreement in L2 acquisition by speakers with an L1 that also has gender (French), as well as an L2 that does not (English). Much like the Bruhn de Garavito and White (2002) study, this investigation sought to examine the acquirability of formal features after the critical period. They found that in both production and picture identification tasks, lower proficiency learners were more accurate on number than on gender and more accurate when the noun was masculine than feminine, regardless of L1. Results from the advanced and intermediate groups did not differ significantly from native speaker results, again, regardless of L1. Overall, White et al. (2004) found highly significant effects for proficiency level, but not for L1, which they argue provides evidence against the FFFH and in support of parameter resetting. Additionally, they found that L2 learners in the low- and intermediate-proficiency groups performed significantly less accurately on feminine gender for DPs that contained a determiner, noun, and adjective than on DPs that only included a noun and determiner; however, it is unclear from their analysis that this is not simply an effect of there being more opportunity for error in DPs that contain both an adjective and a determiner than those that contain only a determiner. Furthermore, they found that the most common error type across groups was where only the gender of adjective was inappropriate and masculine gender was more likely to be attributed to feminine nouns than the reverse.

White et al. (2004) also included a vocabulary task in this investigation, in which participants were asked to supply a lexical item with its determiner. All groups demonstrated significantly greater accuracy on masculine forms ending in *–o*. For the francophones, similarities and differences between the gender of individual items in French and Spanish significantly impacted accuracy; they were noticeably less accurate on lexical items where there was a gender difference between the two languages.

Data collected by Montrul et al. (2008) provide evidence that runs contrary to the conclusions made by White et al. (2004) in that they found that the L2 learners who participated in their oral production task were highly inaccurate, especially with feminine nouns. They believe that the discrepancy in findings between their study and that of White et al. may be due to the degree of difficulty that their oral production task presented. Montrul et al. (2008) note that with the exception of the common and high-frequency nouns *chico, barba, camisa, camiseta,* and *pantalones* White et al. did not provide a complete list of nouns elicited. In contrast, the task employed by Montrul et al. manipulated 50 nouns divided into canonical, non-canonical, and deceptive (*-o* feminine and *–a* masculine) endings, likely resulting in a more difficult task, which could account for the differences found. They found that L1 English speakers performed very well on gender agreement with nouns the exhibit canonical gender endings and were most inaccurate with nouns that have non-canonical gender endings. Montrul et al. find that L2 learners are facilitated by noun endings along the following hierarchy:

(30) canonical ⇒ consonant ⇒ *-e* ⇒ deceptive

They suspect that the majority of the nouns elicited in the White et al. (2004) study had canonical endings, which would explain why L2 speakers demonstrated such high levels of accuracy on the task.

Montrul et al. (2008) employed an interpretation task based on the one used in White et al. (2004) and ended up with similar findings. The L2 learners were less accurate in identifying feminine nouns than masculine nouns; however, many low- and intermediate-proficiency L2 speakers performed with over 80% accuracy. These results, as well as results from other comprehension studies (McCarthy, 2008; Alarcón, 2011) have found variability in learners of lower proficiencies; however, at advanced levels L2 speakers are able to complete tasks in a native-like manner. These researchers have argued that such good results are only possible if the learner's grammar includes the relevant functional feature.

A range of methodologies have been used in examining L2 acquisition of the gender feature. Some of these techniques explicitly examine participants' knowledge of grammatical gender by asking participants to circle the correct form of the determiner or adjective in a text (Montrul et al., 2008) or name an pictured item and circle the appropriate form of the corresponding determiner (White et al., 2004). Other investigations on gender agreement in SLA have relied on carefully constructed offline comprehension tasks, such as picture identification tasks. White et al. (2004); Montrul et al. (2008); McCarthy (2008); Grüter et al. (2012), for example, provide participants with written stories containing null nominal constructions, followed by a picture identification task, which required that participants interpret the grammatical gender of the elided noun in order to identify the target image. These offline tasks provide important information about L2 learners' metalinguistic knowledge. Production tasks are able to further investigate L2 speakers' competence in employing grammatical gender constraints. Common production tasks used in testing L2 acquisition of grammatical gender are picture description tasks (Hawkins, 1998; Bruhn de Garavito and White, 2002; White et al., 2004; Montrul et al., 2008; McCarthy, 2006, 2008; Grüter et al., 2012) or interviews (Franceschina, 2001b; Lardiere, 2008). Spoken language production occurs in real time and therefore is affected by the pressures

of real-time processing (Grüter et al., 2012). It has been suggested that persistent problems that learners exhibit in gender agreement may be the result of difficulty employing syntactic constraints in real-time, rather than a production-specific problem.

As further research has been conducted on feature assembly that underlies tense and agreement relations on the part of L2 speakers, some researchers have concluded that although L2 speakers are able to acquire proper feature assembly in the target language and, in fact, have an unconscious knowledge of the functional projections and features involved in tense and agreement (Prévost and White, 2000; Bruhn de Garavito and White, 2002; White et al., 2004; Montrul et al., 2008), they continue to make non-target-like errors in production. For this reason, Prévost and White (2000) propose the Missing Surface Infleciton Hypothesis (MSIH), which contends that errors with inflectional morphology during spoken production do not reflect the absence or deficiency of the corresponding functional features in the underlying syntactic representation, but rather they are attributable to a failure to select the appropriate morphology at the moment of production. This temporary problem in accessing the relevant lexical item by which inflection is realized is expected to arise specifically during oral production (White, 2011).

McCarthy (2006, 2008) tests Prévost and White's assertion that variability arises due to communication pressure on production. In a series of production and comprehension tasks with intermediate and advanced L1 English / L2 Spanish speakers, learners made errors in roughly 20% of nominal agreement cases with determiners, adjectives and clitic pronouns in both modalities. In all cases, errors predominately came from a substitution of masculine forms where feminine forms were required. Her results suggest that morphological variability does indeed extend to comprehension and that variability is quantitatively similar in production and comprehension. This leads her to postulate the Morphological Underspecification Hypothesis (MUSH),

which asserts that L2 errors are ones of underspecification, not of feature clash (McCarthy, 2006, p. 206). In essence, contrary to the perspective taken by Prévost and White (2000); Bruhn de Garavito and White (2002) and White et al. (2004), McCarthy concludes that problems with tense and agreement for adult L2 learners are *representational*, rather than a production-specific problem.

Another possible alternative to the production-specific problem is that persistent problems that learners exhibit in gender agreement may be the result of difficult employing syntactic constraints in real-time. Grüter et al. (2012) tested this idea with a series of carefully constructed experiments to examine speakers' processing of gender marked items. They employed a comprehension and a production experiment based on those done by White et al. (2004) and Montrul et al. (2008); in addition to those, they implemented an on-line comprehension component in the form of a looking-while-listening task. Participants' eye movements were tracked while they listened to speech stimuli that begin with either *Encuentra...* (find) or *¿Dónde está...* (Where is...) and followed by one of eight Determiner-Noun pairs.

The results of Grüter et al. (2012) in the comprehension task replicated those found by White et al. (2004) and Montrul et al. (2008). They also found expected differences between L1 and L2 speakers in production but unlike previous studies, Grüter et al. coded their data to reflect the nature of the errors. That is to say, agreement errors were flagged as either: *a*) correct; *b*) correct determiner with incorrect adjective *c*) determiner and adjective agree but not with the noun; and *d*) incorrect determiner with correct adjective. They found that the majority of errors were of type (c), which they argue indicates an issue with lexical assignment rather than errors in syntactic constraints. This finding is consistent with findings from Alarcón (2009, 2011), which also indicate that L2 difficulties reside more in lexical assignment than syntactic constraints at advanced levels.

In the online looking-while-listening task, Grüter et al. (2012) found that L2 participants did not process familiar determiner-noun pairs as efficiently as L1 participants, suggesting that there is a weakness in the use of grammatical gender cues in their online processing of familiar nouns. However, they compared these results with those from a similar looking-while-listening study conducted by Lew-Williams and Fernald (2010), in which the Determiner-Noun pairs consisted of definite determiners and novel nouns. In Lew-Williams and Fernald's study, both L1 and L2 participants were presented with 24 teaching trials to four unfamiliar objects, each named with a nonce noun preceded by a definite determiner and transparently marked for gender. When two novel objects of different genders were presented, where the determiner was informative, both L2 and L1 speakers were able to use the gender-marked article preceding the newly acquired nonce noun to identify the proper referent more quickly. It seems, then, from the results of Lew-Williams and Fernald's study that L2 learners ability to employ gender information in a processing task is facilitated by a specific training session. Presumably, the effect found for their study's nonce words would have also been found for the real words as well had there been a training session in the same way as for the novel nouns.

There is a general consensus among the research presented in this section that L2 learners are capable of acquiring new features in the target language and the relevant syntactic constraints that pertain to them. However, it remains unclear whether continued instances of non-target-agreement is the result of a production-specific problem, a representational issue, or a difficulty in employing agreement constraints in real time.

The studies presented here in this chapter rely on L2 speakers' knowledge of gender on real Spanish words and, in the case of Lew-Williams and Fernald (2010), invented words presented in a training session. However, these tasks do not reflect how

L2 learners comprehend and assign gender features 'in the wild', that is to say, when L2 learners are exposed to new vocabulary items for the first time in spontaneous conversation (as is often the case for those who live abroad or even for a classroom learner in conversation with their instructor). During normal comprehension, L2 learners must rely heavily on their auditory abilities, with perhaps some help from contextual cues. To the author's knowledge, the current work is the first study that investigates gender assignment to novel nouns presented in context with no training session to teach participants the words beforehand.

CHAPTER 3

SYNTACTIC DESCRIPTION

3.1 Head-Driven Phrase Structure Grammar

The current work employs Head-driven Phrase Structure Grammar (HPSG) as its framework, which is a lexicalized, unification-based approach that presents an integrated theory of natural language syntax and semantics (Pollard and Sag, 1994). HPSG is a non-derivational generative grammar theory which includes principles, grammatical rules and lexicon entries. This theory presents a lexicalized approach to syntax whereby the lexicon is more than a simple list of entries, it is highly structured and richly descriptive. The primary aim of this grammatical theory is to model human language as systems of constraints with typed feature structures, the core of this model. According to Levine and Meurers (2006, p. 1), HPSG is based on two principle components:

> (i) an explicit, highly structured representation of grammatical categories, encoded as typed feature structures, whose complex geometry is motivated by empirical considerations against the background of theoretical desiderata such as locality; [and] (ii) a set of descriptive constraints on the

> modeled categories expressing linguistic generalizations and declaratively characterizing the expressions admitted as part of the natural language.

HPSG is a system of signs, which can be conceived of as structured complexes of phonological, syntactic, semantic, discourse, and phrase-structural information (Pollard and Sag, 1994, p. 15). All signs possess at minimum the attributes PHON and SYNSEM. The PHON attribute is assumed to be the feature representation that serves as the basis for the sign's phonological and phonetic interpretation. The SYNSEM attribute (which will be the attribute under investigation in this study) includes linguistic information distributed among the attributes SYNTAX and SEMANTICS. In this way, the constraints that are imposed on a given *sign* correspond to the general conventions that govern the sound-syntax-meaning relation in a given language (Ginzburg and Sag, 2000).

The SYNSEM attribute has values of its own called LOCAL (LOC) and NONLOCAL (NONLOC) where NONLOC contains information pertinent in the analysis of unbounded dependencies; LOC information is divided into CATEGORY (CAT), CONTENT (CONT), and CONTEXT attributes, which specify morpho-syntactic, semantic, and contextual information, respectively (Pollard and Sag, 1994; Sag et al., 2003; Levine and Meurers, 2006). As the current work does not involve unbounded dependencies, the NONLOC value is set aside to be addressed in future investigations.

In HPSG, all linguistic information is sorted in feature structures. Each node of the structure is labeled with a *sort symbol* (or *type*), which identifies the type of object the structure is modeling (Pollard and Sag, 1994; Sag et al., 2003). The set of all sort symbols is assumed to be partially ordered; types corresponding to more inclusive types are lower in the ordering. For example, *word* is a *subsort* of *sign* and *accusative* is a subsort of *case* (Pollard and Sag, 1994, p. 18). In essence, HPSG considers language as a system of linguistic entities (e.g., words, phrases, phonemes,

etc.) where types are the classes of those entities. Each grammatical type consists of particular features, which may themselves have particular values (Sag et al., 2003, p. 51).

Feature structures must be *well-typed* (Pollard and Sag, 1994, p. 18), meaning that every feature must be defined for a type for which it is appropriate and provide a value that is at least as specific as the most general type that is appropriate (Carpenter, 1992, p. 88). For example, in English, GENDER is not an appropriate feature for verbs; whereas PERSON is due to the fact that in the present tense, third-person singular verb forms are inflected differently than other person forms (Sag et al., 2003). Conversely, languages like Serbo-Croatian or Russian, which are inflected for gender in the past tense, will have GENDER as a feature for verbs (Wechsler and Zlatic, 2003).

Feature structures that serve as models of linguistic entities must satisfy further criteria of completeness. They are total models of the objects that they represent. For each node, every feature that is appropriate for the sort assigned to that node is actually present. A feature structure is *sort-resolved* provided that every node is assigned a maximal (i.e., most specific) sort label in the ordering (Carpenter, 1992; Pollard and Sag, 1994). For example, in English, the NUMBER (NUM) value of a node labeled *noun* must be labeled either *sg* (singular) or *pl* (plural); it cannot simply be labeled *num* which contains both *sg* and *pl* values in the type ordering. A linguistic entity can be a list or set of linguistic entities that pertain to a certain type. For instance, the value of the SUBCAT feature of a sign is always a list of entities of type *synsem* (Pollard and Sag, 1994, p. 19).

The primary descriptive mechanism for feature structures in HPSG is the *attribute-value matrix* (AVM) diagram, illustrated in Figure 3.1. Here it can be seen that this AVM diagram describes objects of type *word*, as specified by the type in the top-left corner (Sag et al., 2003; Levine and Meurers, 2006; Amaral, 2015), which is

the notation if the object in question has one or more of its attributes specified.[1] Type assignments are indicated by an atomic symbol (e.g. *singular* (*sg*)) if the object in question does not have one or more of its attributes specified (Pollard and Sag, 1994, p. 21). In the sample AVM diagram in Figure 3.1, the value of the PHON attribute is taken to be a list of strings, which serve as a placeholder for a descriptive phonological representation in HPSG (Levine and Meurers, 2006).[2]

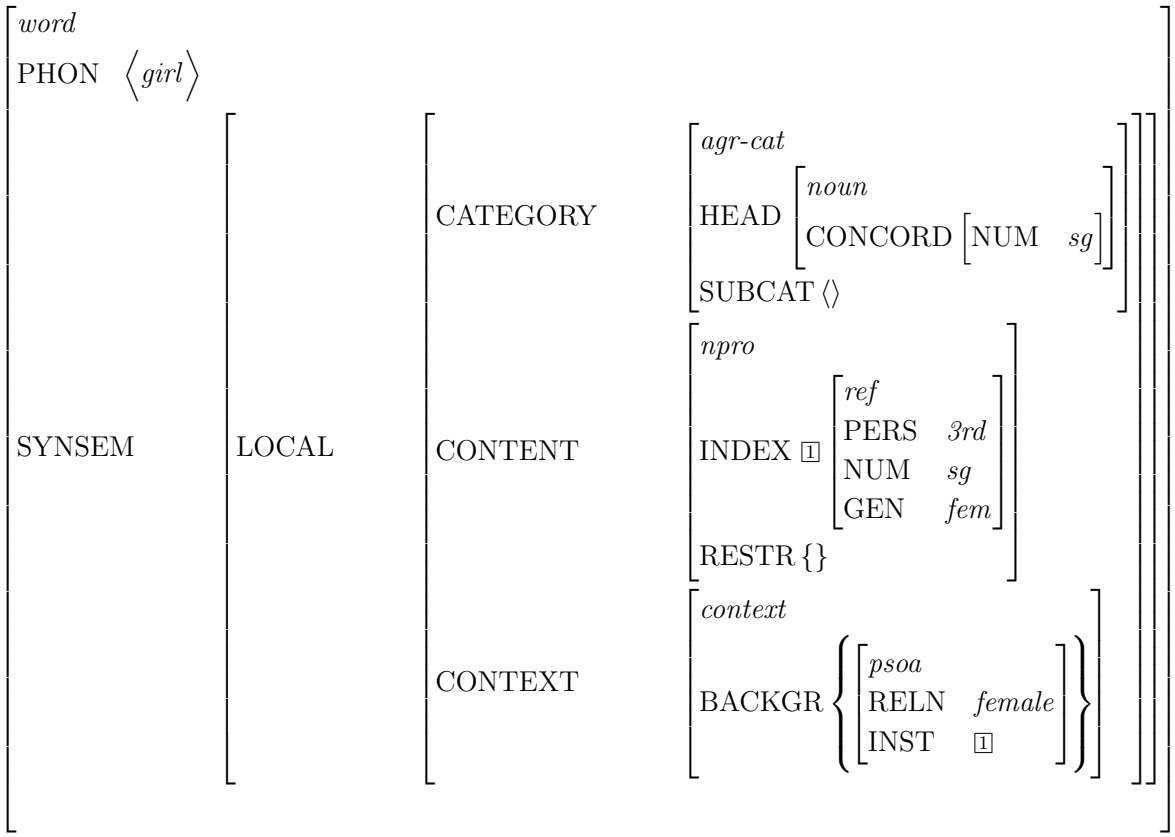

Figure 3.1: AVM diagram for *girl*

In this model, it is possible in a feature structure that two distinct paths can lead to the same feature. For example, the AVM diagram in figure 3.1 illustrates that within the LOCAL domain we find CONTENT and CONTEXT, which both lead

[1] Although in earlier work on HPSG these type assignments were often indicated by left subscripts (Pollard and Sag, 1987, 1994).

[2] For a detailed description of how phonological representation is addressed in HPSG see Bird and Klein (1994) and Höhle (1999).

to the sort symbol *ref* (referent) via different pathways: from CONTENT the referent information is located in the INDEX, this information is labeled with the tag $\boxed{1}$; whereas in CONTEXT, referent information is specified as the value of INSTANCE (INST) within the BACKGROUND (BACKGR) attribute (Pollard and Sag, 1994, p. 17). The value of INST is ensured to be *referential* with the same information as is found in the INDEX as they are labeled with the same tag, $\boxed{1}$. Cases such as these are known as *structure sharing*: two paths share the same structure as their common value. Structure sharing means that there is token identity of values, which is to say that the values are not simply structurally identical, but they, in fact, share the same identity. In HPSG, structure sharing is the fundamental explanatory mechanism (Pollard and Sag, 1994, p. 19).

In terms of notation as it pertains to the AVM descriptions, as illustrated in Figure 3.1, structure sharing is indicated by multiple occurrences of boxed numbers, known as *tags* (i.e., $\boxed{1}$). Attributes labeled with the same tag are token identical (Pollard and Sag, 1994, p. 21). Descriptions of sets are provided in curly brackets, while unfilled brackets (i.e., {}) denote an empty set. Angled bracket notation (i.e., $\langle\rangle$) is used to abbreviate descriptions of lists, with unfilled brackets denoting an empty list (Pollard and Sag, 1987, 1994; Sag et al., 2003).

The subset of CATEGORY properties that are necessarily structure shared between mother and head daughter are found in the HEAD attribute (Levine and Meurers, 2006). The object described in Figure 3.1 is of type *noun*, which has an agreement feature for NUMBER (NUM), found in the CONCORD attribute, whose value in this case is *singular* (*sg*). The SUBCAT value is the object's valence, which is to say, it is composed of a list of *synsem* objects that correspond to the SYNSEM values of the other

objects selected as complements by the object in question (Pollard and Sag, 1994, p. 23).[3]

It is possible in the AVM diagram, to illustrate only the information that is pertinent to the linguistic aspect under study. For instance, the AVM diagram in Figure 3.2 provides a partial description of the information presented in Figure 3.1. The value of the path SYNSEM | LOC | CAT | HEAD is specified only as *noun*, with no indication of the CONCORD attribute or its values. Additionally, for the path SYNSEM | LOC only the CATEGORY value is described; the values of CONTENT and CONTEXT are omitted (Pollard and Sag, 1994, p. 20).

$$\begin{bmatrix} \text{SYNSEM} & \begin{bmatrix} \text{LOCAL} & \begin{bmatrix} \text{CATEGORY} & \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{noun} \end{bmatrix} \\ \text{SUBCAT} \langle\rangle \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Figure 3.2: Partially specified description of *girl*

In order to specify well-formed phrases of a given language, the phrase in question must satisfy all the principles of grammar, both universal and language-specific. In HPSG, phrases have an additional attribute, DAUGHTERS (DTRS) that words do not (Pollard and Sag, 1994, p. 31). One of the most important universal principles proposed in HPSG is the *Head Feature Principle* (HFP), stated in (31) as defined by Pollard and Sag (1994, p. 34).

(31) HEAD FEATURE PRINCIPLE (HFP):

The HEAD value of any headed phrase is structure shared with the HEAD value of the head daughter.

The HFP is formulated to guarantee that headed phrases are, in fact, projections of their daughters. Therefore, in a simple phrase, such as *Girls achieve greatness*,

[3]The constraints set forth by the object's SUBCAT values control determiner selection, verbal complements, and other subcategorization information.

illustrated in Figure 3.3, the HEAD value of the head daughter (*achieve*) is token identical, as indicated by '1', to the head value of the phrase.

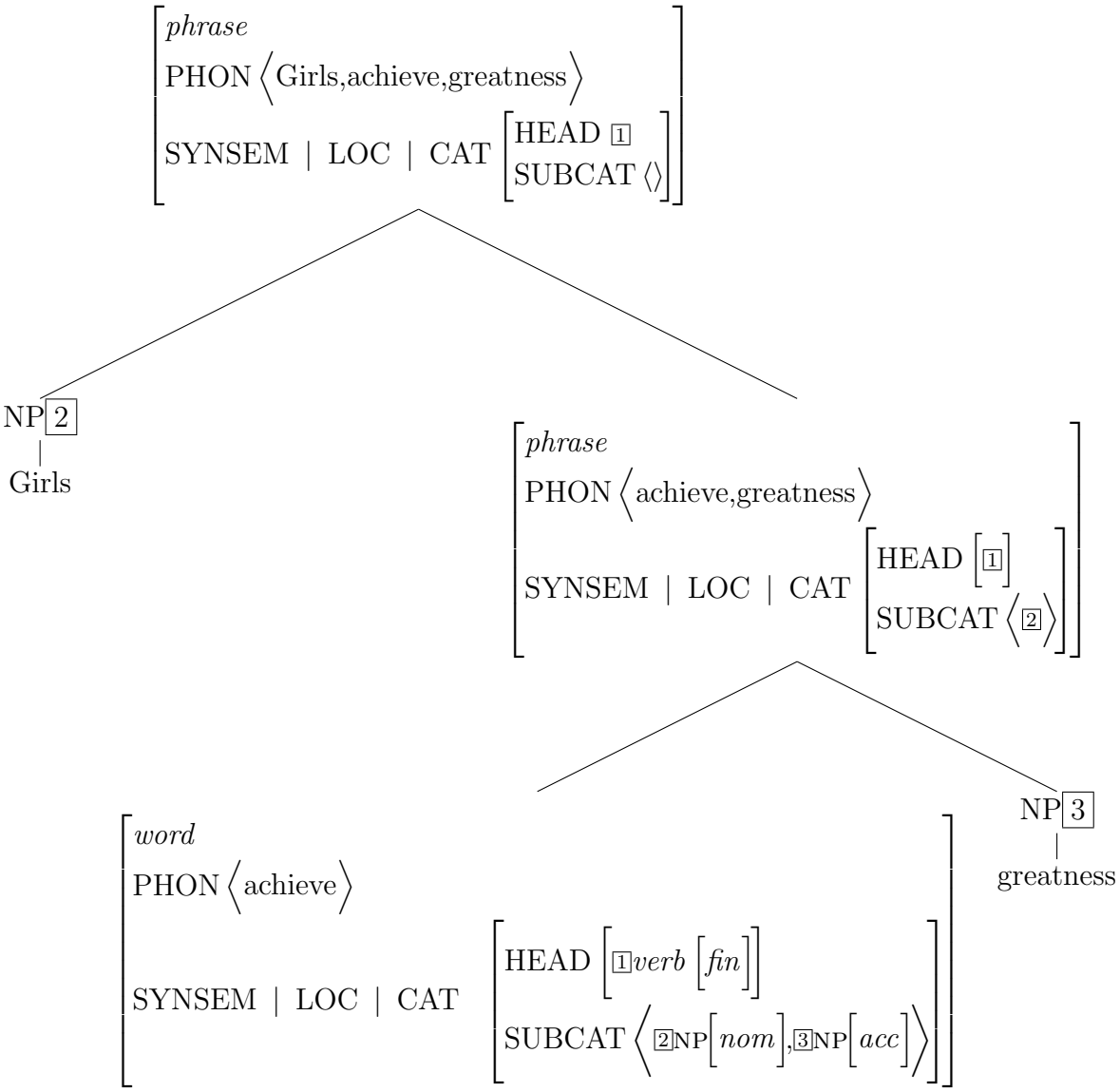

Figure 3.3: Simple Phrase described in HPSG

Additionally, in Figure 3.3, the SYNSEM value of the complement daughter of the VP (indicated by the tag '3'), is token identical to an element on the SUBCAT list of the head daughter. The SUBCAT list of the VP itself, on the other hand, consists only of the SYNSEM value of the specifier ('2'),[4] as the requirements of the verbal

[4]In this case the specifier is the subject of the phrase.

complement have been satisfied at this level by the complement daughter ('$\boxed{3}$'). Likewise, the value of SUBCAT at the maximal phrase level is an empty list, as at this point all subcategorization requirements have been met. This exemplifies another important principle of HPSG, known as the *Subcategorization Principle*, which is stated in (32) as formalized by Pollard and Sag (1994, p. 31).

(32) THE SUBCATEGORIZATION PRINCIPLE:
In a headed phrase (i.e. a phrasal sign whose DTRS value is of sort *head-struc*), the SUBCAT value of the head daughter is the concatenation of the phrase's SUBCAT list with the list (in order of increasing obliqueness) of SYNSEM values of the complement daughters.

This principle, in essence, works as a virtual check mark next to each of the subcategorization requirements on the lexical head as they become satisfied by the complement daughters of the phrasal projections.

The principles presented above are universal, constraining the grammar of any natural language. Differences in languages can be seen in their type hierarchies, that is to say, in the organization and arrangement of types and the features that belong to them. Generally speaking, the higher a feature is found in the type hierarchy, the more productive it is in that language as it is an appropriate feature for all types below it in the hierarchy.

3.2 Agreement in HPSG

In HPSG, agreement is treated as a phenomenon that involves unifying information from various sources through *structure sharing*. Nominal agreement is subdivided into CONCORD and INDEX agreement, which result from different grammatical processes and consequently differ with respect to the domain of agreeing elements, the set of

relevant features, and the nature of the morphological realization (Pollard and Sag, 1994; Kathol, 1999; Wechsler and Zlatic, 2003).

3.2.1 Levels of Agreement

Positing separate types of agreement allows us to account for a variety of agreement relations. To begin, the INDEX and CONCORD attributes differ in their syntactic domains. The CONCORD attribute is a head feature that dictates agreement values in the local domain (i.e., within the Noun Phrase). The CONCORD features of a given noun inform morpho-syntactic agreement and can be closely related to the noun's phonological form (Wechsler and Zlatic, 2003). On the other hand, INDEX is part of the semantic CONTENT field and as such, the INDEX | GENDER and INDEX | NUMBER features are closely related to the noun's semantics (Pollard and Sag, 1994; Sag et al., 2003; Wechsler and Zlatic, 2003). Additionally, in English, Spanish, and Portuguese the INDEX also controls verbal agreement with a value for PERSON (PER). Wechsler and Zlatic (2003) proposes the following network of relationships:

(33) $\boxed{\text{morphology}} \Leftrightarrow \boxed{\text{CONCORD}} \Leftrightarrow \boxed{\text{INDEX}} \Leftrightarrow \boxed{\text{semantics}}$

In typical cases of agreement, these four sources of information on the noun provide congruent agreement clues and features that appear in both CONCORD and INDEX will have identical values, although there are exceptions, which are addressed later in this chapter.

Index agreement attaches to the referential index; it therefore applies to pronouns and predicative adjectives, which are referentially anchored. Verbal agreement markers often originate from incorporated pronouns, which is why we see that index agreement frequently applies to verbs as well as pronouns. NP-internal elements, on

the other hand, such as determiners and attributive adjectives display agreement that is generally not related to coreference, as is illustrated below in (34).

(34) Este libro viejo
This$_{sg.masc}$ book$_{sg.masc}$ old$_{sg.masc}$
This old book

Example (34) illustrates CONCORD agreement, which is the sharing of morpho-syntactic head features between certain designated elements. This comes about automatically when the head is unified with dependents and adjuncts and is ensured by constraints such as with the Specifier-Head Agreement Constraint (illsutrated in Figure 3.4), which ensures that the specifier of an entity have CONCORD feature values that match its own (Sag et al., 2003; Wechsler and Zlatic, 2003).

$$\begin{bmatrix} \text{HEAD} & \left[\text{CONCORD } \boxed{1}\right] \\ \text{SUBCAT} & \left[\text{SPR } \left\langle \left[\text{HEAD } \left[\text{CONCORD } \boxed{1}\right]\right] \right\rangle\right] \end{bmatrix}$$

Figure 3.4: Specifier-Head Agreement Constraint (SHAC)

As mentioned in the previous section, the tag '$\boxed{1}$' denotes a single structure, thereby requiring that a specifier and head have CONCORD values that are token-identical, this constraint prevents the formation of ungrammatical specifier-head combinations, such as **This dogs*.

Since the INDEX and CONCORD attributes differ in their syntactic domains, it is logical that they may involve different feature sets. In Spanish, for example, the features *person*, *number*, and *gender* reside in the INDEX; but in CONCORD we find *number* and *gender*. Additionally, the feature sets for each can vary depending on the language; for instance, Serbian/Croatian has a *case* feature in CONCORD (Wechsler

and Zlatic, 2003) and Asturian, a minority Romance language found in the north of Spain, has a *countability* feature in the INDEX (Faber, 2015).

Considering that INDEX agreement is the grammaticalization of the constraints on anchoring of the index in a discourse, it follows that subject-verb agreement is made via the INDEX and thus requires the inclusion of *person* as one of its features. Conversely, *person* is rarely (if ever) involved in NP-internal concord (Kathol, 1999; Wechsler and Zlatic, 2003). As nouns in Spanish do not inflect for *person*, it is not an appropriate feature for a noun's CONCORD structure.

Providing separate agreement descriptions for morphosyntactic and referential relations also provides a neat account for cases of mixed agreement, as in example (35),[5] or cases of metonymy, such as in (36)[6] (Pollard and Sag, 1994; Kathol, 1999; Wechsler, 2013).

(35) Su Majestad suprema está contento.
Your Majesty$_{fem}$ supreme$_{fem}$ is content$_{masc}$
Your supreme Majesty is happy.

(36) The hashbrowns at table nine is getting angry.

In these cases, certain lexically specified words or semantic interpretations allow for distinct GENDER and/or NUMBER values between CONCORD and INDEX.

Kathol (1999, pg. 248) suggests that for Spanish, feature values for *gender* and *number* in the INDEX are determined by those found in CONCORD unless the referent is personal, in which case the natural number and gender determine the index features. Therefore, for a non-personal referent, such as *coche* (car), the information about gender and number in the INDEX comes from gender and number values in CONCORD, which are part of the noun's lexical description:

[5]This example comes from Kathol (1999).
[6]This example is taken from Pollard and Sag (1994).

$$\begin{bmatrix} ...| \text{ CONCORD} \begin{bmatrix} \text{NUM} & \text{sg} \\ \text{GEND} & \text{masc} \end{bmatrix} \\ ...| \text{ INDEX} \begin{bmatrix} \text{PER} & 3 \\ \text{NUM} & \text{sg} \\ \text{GEND} & \text{masc} \end{bmatrix} \end{bmatrix}$$

Figure 3.5: INDEX and CONCORD description for Spanish *coche*

As we saw in the previous section in (34), agreement within the NP is made through the structure sharing of CONCORD between the determiner, noun, and modifier. The relationship between the noun and predicative adjective, such as *limpio* ('clean') in (37) is referential, rather that strictly syntactic. Therefore, agreement is made through the merging of index values.

(37) El coche está limpio.
The$_{sg.masc}$ car$_{sg.masc}$ is clean$_{sg.masc}$
The car is clean.

(38) Lo limpié ayer.
It$_{sg.masc}$ I.cleaned yesterday
I cleaned it yesterday.

Pronominal agreement is also based on a referential relationship. As such, pronominal agreement, such as *lo* (the Spanish masculine singular accusative pronoun) in (38), is also formed via structure sharing of INDEX feature values.

3.2.2 Agreement with Animate Referents

In general, nouns that have a personal referent exhibit the same values in CONCORD and the INDEX for *gender* and *number* as well. For example, a noun like *hombre* (man) or *niño* (boy) has the morphosyntactic values *masculine* and *singular* in CONCORD; the values for *gender* and *number* in the INDEX will be the same because the natural number and gender of the referent is masculine and singular.

Kathol (1999) argues that although the *gender* and *number* values in the INDEX and CONCORD often correspond, there is evidence that this information comes from different sources. Epicene nouns, such as *Majestad* (Majesty) in Spanish, are nouns that have only one grammatical form to refer to a being of either biological sex.[7] In this case, *Majestad* is always feminine, even if the referent is biologically male. Therefore, according to Kathol, gender values in the INDEX must come from the natural gender of the referent, so the gender value in the INDEX is left unspecified in the item's lexical description until the item is instantiated in discourse.

$$\begin{bmatrix} \ldots \mid \text{CONCORD} \begin{bmatrix} \text{NUM} & sg \\ \text{GEN} & fem \end{bmatrix} \\ \ldots \mid \text{INDEX} \begin{bmatrix} \text{PER} & 3 \\ \text{NUM} & sg \\ \text{GEN} & \end{bmatrix} \end{bmatrix}$$

Figure 3.6: INDEX and CONCORD description for *Majestad*

When the word is anchored to someone real in the world, the gender value in the INDEX is specified as either masculine or feminine, depending on the biological gender of that person. Kathol uses the sentence in (35), reproduced below in (39) for convenience, to illustrate how CONCORD and INDEX agreement can account for cases of mixed agreement.

(39) Su Majestad sumprema está contento.
His Majesty supreme$_{sg.fem}$ is content$_{sg.masc}$
Your Majesty is happy.

The issue with Kathol's analysis, however, is that the sentence in (39) represents a very rare phenomenon, even among epicene cases in Spanish, which are a rare class in and of themselves. For example, many Spanish speakers judge the sentence above to be well formed when speaking about the King; however, the same speakers who

[7] See section 2.1 for further explanation and examples of epicene nouns and grammatical gender.

find (39) to be acceptable, judge the sentence in (40) not to be, even if the victim is a male.

(40) * La víctima estaba gravemente herido.
The$_{sg.fem}$ victim was gravely injured$_{sg.masc}$
The victim was badly hurt.

Therefore, rather than state, as Kathol (1999) does, that the values for gender and number in the INDEX come from those values in CONCORD unless the referent is personal, a more adequate solution is to state that the values for gender and number in the INDEX always come from those values in CONCORD except in those cases where they are lexically and contextually specified.

In addition to epicene nouns that are partially unspecified for gender, there are two other classes that are unspecified for gender in their lexical description: bigender and ambiguous gender nouns. Bigender nouns refer to animate beings. Like epicene nouns, they only have one lexical form to denote male and female referents; however, unlike epicene nouns, their grammatical gender reflects the referent's biological gender, which is established either via agreement relations with determiners and adjectives or via anchoring conditions to a male or female referent. Therefore, the lexical description for a bigender noun such as *estudiante* (student) will appear as in Figure 3.7 with masculine and feminine values available for the GENDER attribute.

A bigender noun can become specified for gender in one of two ways: first, it can be anchored to a specific student, in which case the gender value is established in the INDEX via anchoring conditions; CONCORD then receives its gender value from the INDEX value of *gender*; or second, it can be instantiated in the discourse with other linguistic elements, which merge with the noun. In this case, gender would be specified in CONCORD, which in turn establishes the gender value in INDEX. Since *estudiante* is unspecified for gender, it is compatible with a linguistic element of either

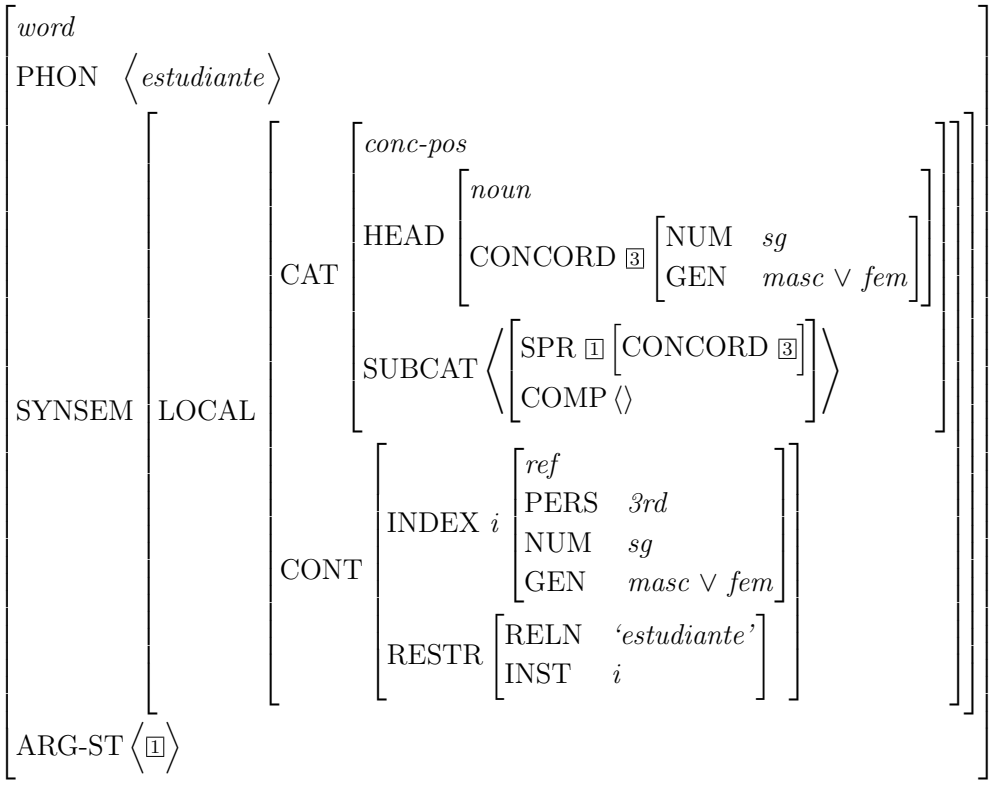

Figure 3.7: Lexical entry for '*estudiante*' (student)

gender. However, once the gender is specified, the lexical item no longer is optional, but rather fully specified for gender as with any other noun in Spanish. The maximal projection of '*la estudiante*' as it might be instantiated in discourse is illustrated in Figure 3.8.

Ambiguous gender nouns are those whose grammatical gender varies in usage, such as *el/la mar* (the sea). Sometimes these types of nouns experience a nuanced semantic change with a change in gender. Additionally, individual speakers or dialectal groups may be inclined to use one gender over the other.

Ambiguous gender nouns, like their bigender compatriots, are underspecified for gender; therefore, the lexical description for an ambiguous gender noun such as *mar* ('sea') has both masculine and feminine values available. However, unlike bigender nouns, these nouns can only be specified for gender by being instantiated in the

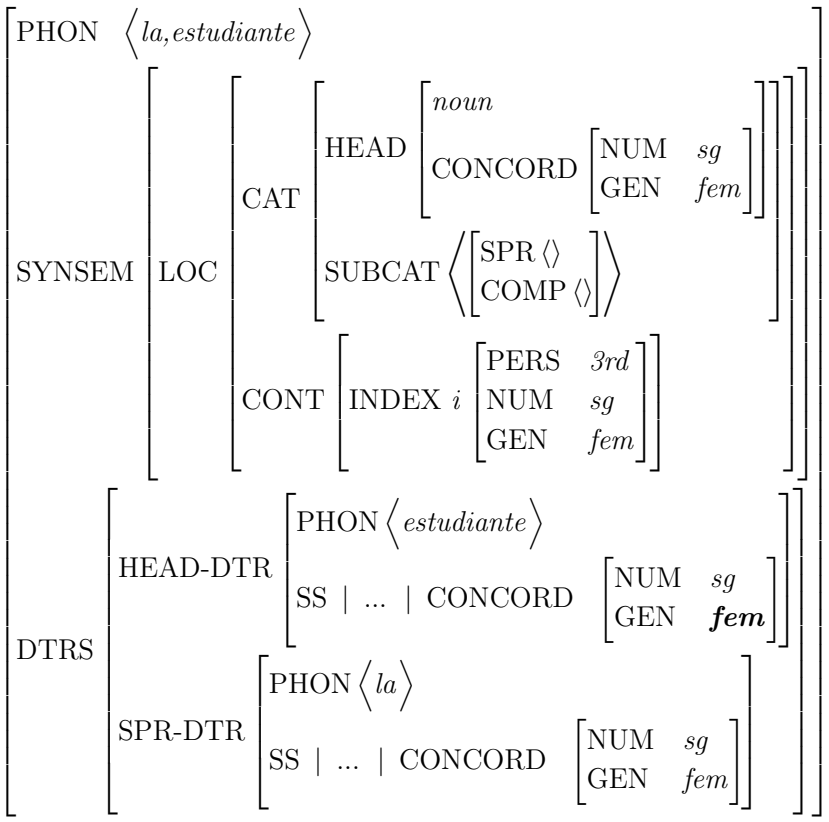

Figure 3.8: Instantiated entry for '*la estudiante*' (the (female) student)

discourse with other linguistic elements, which are unified with the noun. Since *mar* is unspecified for gender, it is compatible with a linguistic element of either gender. However, once it is specified as masculine, for example, it becomes fully specified and cannot be unified with feminine elements.

3.3 Language Ontology

The feature structure (*feat-struc*) for each language will necessarily be unique as it captures the differences in linguistic organization from one language to the next and describes the features that are productively used in any given part-of-speech (*pos*) and how they are hierarchically organized. Spanish and Portuguese share a similar feature structure in many (but by no means all) regards. However, when it comes to the gender feature, the feature structure for both Spanish and Portuguese is the same, as can be seen in the *part-of-speech (pos)* feature structure illustrated in Figure 3.9 below.

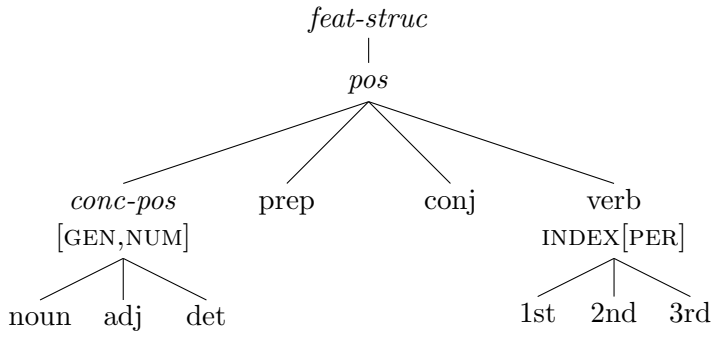

Figure 3.9: Type-hierarchy for Spanish & Portuguese

Here we see that the features GEN (gender) and NUM (number) are values of the category CONCORD, where features of morphosyntactic agreement reside. These features are applicable to nouns, adjectives and determiners in Spanish and Portuguese,

as illustrated by the Spanish examples in (41) and (42) and the Portuguese examples in (43) and (44).

(41) El libro viejo es negro.
The$_{sg.masc}$ book$_{sg.masc}$ old$_{sg.masc}$ is black$_{sg.masc}$
The old book is black.

(42) Las sillas viejas son rojas.
The$_{pl.fem}$ chairs$_{pl.fem}$ old$_{pl.fem}$ are red$_{pl.fem}$
The old chairs are red.

(43) O livro velho é preto.
The$_{sg.masc}$ book$_{sg.masc}$ old$_{sg.masc}$ is black$_{sg.masc}$
The old book is black

(44) As poltronas velhas são vermelhas.
The$_{pl.fem}$ chairs$_{pl.fem}$ old$_{pl.fem}$ are red$_{pl.fem}$
The old chairs are red.

The feature structure that pertains to English nominal agreement differs quite markedly from Spanish and Portuguese. The feature structure regarding nominal agreement has only number (NUM) as a CONCORD feature; gender (GEN) in English is found as an INDEX feature within the subset of animate nouns, as illustrated in Figure 3.10.[8]

As NUM (number) is a feature of CONCORD, it is a feature involved in morphosyntactic agreement, which accounts for the differences between (45) and (46); whereas GEN (gender) exists as an INDEX feature of animate nouns; therefore, it is involved in referential agreement, such as with pronouns, but does not influence morphosyntactic agreement relations, as illustrated in (47) and (48).

(45) **This dog** is tired.

[8]This feature structure is based on the Type Hierarchy established by Sag et al. (2003, p. 118) and the agreement analysis from Wechsler and Zlatic (2003).

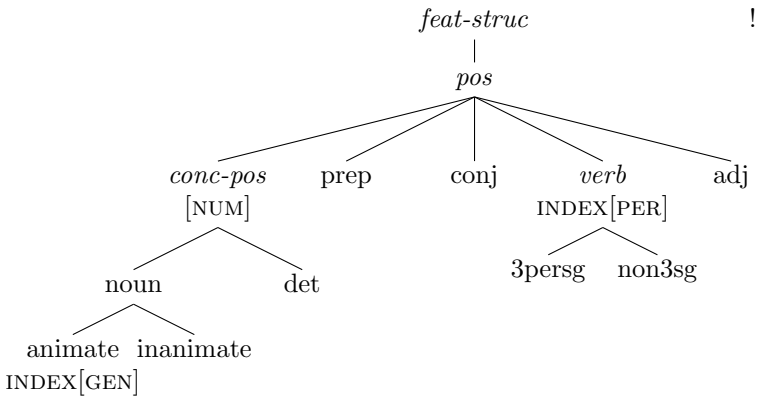

Figure 3.10: Type-hierarchy for English

(46) **These dogs** are tired.

(47) That **king**$_i$ gave **his**$_i$ subjects some gold.

(48) That **princess**$_j$ fixed **her**$_j$ dress before leaving.

Additionally, in the feature structure for English, we see that unlike Spanish and Portuguese, which have the *part-of-speech* category for adjectives (adj) within the *conc-pos* category, signifying that adjectives enter into morphosyntactic agreement relationships with nouns and determiners, English adjectives fall outside the *conc-pos* category. This is to say that adjectives in English are invariable.

(49) This **old** dog is tired.

(50) These **old** dogs are tired.

In (49) and (50) we see that the number of dogs only effects the determiner and the verb required for the context while neither the attributive adjective (old) nor the predicative adjective (tired) change.

CHAPTER 4

FEATURES IN ACQUISITION

Features are the atoms of language; they are the primitive elemental units that make up the lexical items of every language (Lardiere, 2009b). Over the course of the last half-century, features have played a central role in generative linguistic theories, originally proposed as a way to describe different facets of a single language. In phonology (Chomsky and Halle, 1968), distinct phonological segments were assumed to be comprised of bundles of acoustic or articulatory features (e.g., [±voice], [±vocalic]), while in syntax (Chomsky, 1965), features were introduced as a way to express properties of lexical items (e.g., [±transitive]). Over time these theories have developed and the use of features in linguistic theory has been expanded to account for issues concerning learnability and linguistic variation. Today, differences between languages and even linguistic variation within a single language is assumed to stem from differences in feature selection and assembly (Travis, 2008; Lardiere, 2008, 2009b).

As linguistic theory evolved, features began to take on a new role (Chomsky, 1986), projecting functional categories such as CP or IP, later split into TP and AgrP (Pollock, 1989). Chomsky (1993, 1995) proposes that bundles of features define the content of functional categories. In this way, syntactic differences and

their resulting interpretations are expected to be restricted to the features that head functional categories such as C (*complementizer*), T (*tense*), Agr (*agreement*), or D (*determiner*); each of these functional categories is made up of sets of formal features, for instance [±wh] in C, [±past] in T, [±plural] in Agr, or [±definite] in D.

Features have played a prominent role in acquisition theory over the past few decades (Hyams, 1986; Flynn, 1996; White, 2000; Leung, 2009). The acquisition process of one's first language is assumed to be a process of selecting and assembling the relative features in the target language from an innate, limited universal inventory of linguistic features available to all children as part of their Universal Grammar (UG). The idea of feature selection from a limited set of possibilities emerged as a solution to what has been referred to as the 'logical problem of language acquisition' that children simply do not receive sufficient input from their environment to account for the complex linguistic system that they develop (Chomsky, 1981b). Different linguistic systems select features and assemble them onto functional categories in unique, language-specific ways; occasionally even bundling features differently for distinct clause types within the same language (Hegarty, 2011). A child's developing language will likely not make use of all of the features available in the UG set. The task of the small language acquirer is therefore to select only the subset of features present in their language while 'discarding' the others (Chomsky, 2001; Rizzi, 2005).

4.1 Features and Parameters

The introduction of Chomsky's Principles and Parameters model (Chomsky, 1981a,b, 1986) was initially applied to first language acquisition as a solution to the 'logical problem of language acquisition' such that inherent universal features could bridge the gap between the poverty of the stimulus (that is to say insufficient input) and the

ultimate linguistic system developed. According to this model, Principles are invariant and provide restricted conditions for all natural language grammars. Language variation is then accounted for by a set of Parameters, which provide specific, constrained options along which languages can differ, ideally in terms of binary options. Parameters are assumed to be comprised of bundles of linguistic features that exist as a part of each person's Universal Grammar inventory, which theoretically restricts the possible variation across languages (Chomsky, 1981a). The theoretical consequences of such an idea were thought to be that the process of acquiring a language (either first or second) is that of "simply" deducing the parameters that are active in the desired language. The system has often been likened to a switchboard where the language acquirer's task is to turn off or on relevant parametric switches as they progress through the acquisition process.

The Principles and Parameters framework initially held great potential for explaining and predicting the acquisition path for second language learners. Each parameter was expected to hold associated properties; therefore, a learner's ability to reset a parameter was predicted to result in target-like acquisition of a variety of syntactically related phenomena. The emergence of the pro-drop parameter (Chomsky, 1981b; Rizzi, 1982; White, 1985) the polysynthesis parameter (Baker, 1996), and the compounding parameter (Snyder, 2001; Slabakova, 2002; Liceras et al., 2002) are among some of the parameters proposed whose related effects were predicted to ease the task of language acquisition. However, as further research has been conducted in first and second language acquisition, it seems that empirical data is not nearly so clear and straightforward.

Defining what exactly is and is not a parameter has been the source of much debate; for instance, one proposal is that parameters are restricted to formal features with no interpretation at the interface, while an even stronger proposal states that

parameters are restricted to formal features on functional categories (Borer, 1984; Chomsky, 1995). Additionally, pinpointing specific parameters that are valid cross-linguistically has been a challenge in the light of empirical data. Baker (1996, p. 7) suggests that with the discovery of more and more parameters like the Pro-drop parameter, we might expect to find that these parameters would be clustered in nonarbitrary ways, which would yield the discovery of macroparameters. In actuality, quite the opposite has occurred where parameters have become smaller, more refined and specific, capturing increasingly smaller ranges of phenomena, rather than larger and more general (Baker, 1996; Lightfoot, 1997).

Kayne suggests that some of the parameters that have been proposed over the course of the last three decades have been too coarsely characterized and therefore proposes using the term 'microparameter' for those parameters that differentiate two very closely related languages (2005, p. 7). Baker (1996) suggests that the Pro-drop parameter is a prime example in that Italian and Spanish share a list of properties, seen in (51) related to their Pro-drop status that clearly distinguishes them from French; however, upon taking into account data from a wider range of languages (Baker cites dialects from northern Italy and Southern France) these properties do not form such a neat cluster after all.

(51) **i** Subjects of simple tensed clauses can be missing.

ii Subjects can appear optionally after the verb in simple sentences.

iii Subjects can be extracted from embedded questions.

iv Null (subject) resumptive pronouns are found in embedded clauses.

v Subjects can be extracted even if there is a complementizer preceding.

vi Copular verbs agree with postverbal NP rather than the expletive.

vii Two adjacent verbs can "restructure" and act like a single verb.

There are languages that have some properties on the list but not all. This becomes all the more complicated when we add in languages undergoing a linguistic shift, such as Brazilian Portuguese, which is in the process of moving away from its Pro-drop status and therefore we find that in some situations it behaves like a Pro-drop language, whereas in others it has distinct non-Pro-drop properties (Kato, 1999; Duarte, 2000).

4.2 Transfer and Access in SLA

The emergence of the Principles and Parameters theory (Chomsky, 1981a) and its subsequent prominence in linguistic theory gave way for researchers to investigate language variation and the role of transfer, which took a specific focus on whether L2 learners are able to (re)set parameters of UG (White, 1985; Flynn, 1996; Hawkins and Chan, 1997; Hawkins, 1998; Fernández-García, 1999; Bruhn de Garavito and White, 2002). Research within the Principles and Parameters framework has investigated SLA largely in terms of *transfer* and *access* (White, 2000), by which *transfer* refers to the degree to which L2 speakers transfer their L1 grammar to their L2 in the initial state and *access* refers to the amount that L2 speakers are able to utilize UG. Generative theories have concentrated their investigations largely around what precisely is being restructured in the L2 speaker's interlanguage (IL) and what resources do they have to aid in the process.

The deficit view of language acquisition, as the name suggests, assumes that certain properties of UG are not available beyond the critical period. There has been much debate as to what aspects, if any, of UG are available to L2 learners. The Fundamental Difference Hypothesis put forth by Bley-Vroman (1990) assumes that parameters that do not exist in the L1 cannot be acquired in the L2. Vainikka and

Young-Scholten (1996) assert the Minimal Trees Hypothesis in which only lexical categories, such as the Noun Phrase, are transferred from a speaker's L1 into their L2, but functional categories, such as Tense, do not transfer. This hypothesis suggests that the L2 learner's initial state of their L2 consists of minimal syntactic trees and they must develop functional categories during the acquisition process. Along a similar line, Eubank (1993, 1996) proposes the Valueless Features Hypothesis in which lexical and functional projections transfer to the initial state of the L2 but feature values such as strength of agreement do not transfer.

The Failed Functional Features Hypothesis (FFFH) asserted by Hawkins and Chan (1997) and Hawkins (1998) posits that the IL grammar is restricted to formal features present in the L1, thus new features cannot be acquired. Hawkins and Chan (1997) assert that learners cannot acquire formal features of functional categories if they have not been activated before the end of the critical period (before puberty); however, they do contend that feature strengths can be reset. Under this assumption, L1 English speakers learning French are predicted to be able to acquire noun-raising to NUM because both English and French have number features. As NUM has been activated in the grammar of the L1 English speaker before the end of the critical period, it is still accessible post-puberty and its feature strength is resettable. The FFFH has evolved into the Representational deficit approach (Hawkins, 2001; Hawkins and Liszka, 2003; Tsimpli and Mastropavlou, 2008) which suggests that language variance lies at the point of selection of particular features for the assembly of lexical items.

A number of studies in L2 acquisition have provided support for the FFFH and the Representational deficit approach (Hawkins, 1998; Hawkins and Franceschina, 2004; Franceschina, 2001b,a, 2005; Tsimpli and Mastropavlou, 2008). Hawkins (1998) found instances of optionality in L2 French speakers (L1 English) as they produce both masculine and feminine determiners with the same noun. Franceschina (2001a,b)

suggests that formal features that are not present in a learner's L1 are not acquirable beyond the critical period based on number and gender studies with L2 Spanish learners with L1 of English or Italian. Tsimpli and Mastropavlou (2008) find that in the use of definite and indefinite articles in Greek, adult L2 speakers, unlike SLI and L2 children, show native-like use of the indefinite article; however, their use of definite determiners is "far from targetlike in the data from all the subjects" (p. 172). They take this as evidence in support of the assertion that age of acquisition is crucial for acquiring clusters of morphosyntactic features that consist of clusters of uninterpretable feature values of case and agreement.

The aforementioned theories of SLA all suggest that there is an aspect of UG that is missing or unattainable, the necessary prediction for ultimate L2 attainment is that the speaker's linguistic system will necessarily differ from the grammar of a native speaker. It is important to note that not only do these theories predict that the end state grammar of L2 speakers will differ from that of native speakers, but it is generally described in this view as being somehow 'incomplete' in some fundamental way.

In contrast to deficit theories of second language acquisition, full access theories assert that L2 learners have all the properties of UG that are available in L1 acquisition at their disposal (Schwartz and Sprouse, 1996; White, 1989, 2000). Within this perspective, all functional properties if the L2 are considered to be fully attainable and IL grammars are fully constrained by UG in the functional domain. Schwartz and Sprouse (1994, 1996) argue for a theory of full transfer and full access in which the initial state of the L2 is the steady state of the L1; however, unlike in the deficit perspective, properties of UG that are not instantiated in the L1 are assumed to be available to constrain IL grammars. Therefore, the task of acquisition involves the learner initially using their L1 system to interpret L2 input. When properties of the

L2 input suggest that the L1 grammar is inadequate, restructuring occurs (White, 1985). In this perspective, L2 learners can, theoretically, attain fully native-like end state grammars; however, this may not occur when learners fail to identify aspects of the L2 that differ from their L1.

4.3 Feature Assembly in SLA

The prominence of features in acquisition work within the Principles and Parameters framework has provided a solid body of research with insight into the acquisition process. However, since this theory's inception, there has yet to be consensus among researchers in the definition of specific parameters, which has led some to suggest a shift away from parameters and toward features as the primary focus in linguistic theory, particularly as it relates to language acquisition (Baker, 1996; Lightfoot, 1997; Travis, 2008; Lardiere, 2008, 2009b). Lardiere (2009b) suggests that since the theoretical construct of parameters has to date added 'little of any substance to explaining SLA' (p. 180) that we should at least for the moment set it to the side, and instead require descriptions of lexical items and functional categories primarily in terms of their features as well as the possible constraints on the assembly of features (assuming features to be the primitive descriptive atoms of language).

Lardiere (2008, 2009b) suggests that focusing on parameter setting and feature selection as a way to describe the L2 acquisition process is not sufficient and that the issues in Second Language Acquisition data require a much more fine-grained analysis. What we should be focused on, she argues, is the assembly of features in SLA because accounting for morphological variability simply by appealing to parameter (non)selection of features is too simplistic to account for L2 data. She asserts that there is a morphological competence that must be acquired by the learner, by which

she means 'the knowledge of precisely which forms go with which features' (Lardiere, 2008, p. 111). So, for an L2 learner to assemble particular lexical items in the target language, they must reconfigure features from the way they are represented in the L1 into new formal configurations onto lexical items that may differ markedly in the L2. Lardiere (2009b) provides plural marking as an example, where generative approaches seem to assume that the feature [+plural] in one language is the exact same [+plural] in a different language. She compares lexicalized plural affixes such as *-men* in Chinese and *-tul* in Korean with the plural system in English:

> One can conclude that the plural in Korean, for example, is more like that in Chinese than in English in some aspects, more like English than Chinese in other aspects, and - with respect to unusual phenomena such as extrinsic plural-marking - not like either other language at all. In other words, the plural lexical items in these langages are assembled somewhat differently from each other, each selecting different co-occurring features - e.g. such as definiteness, specificity, (human/non-human) animacy - and different conditioning environments (p. 210).

Although Lardiere has good intuitions by calling into question basic assumptions that we have about linguistic features and working to more precisely define them and how they work, the data she provides about plural marking in Chinese, Korean, and English do not seem to be sufficient evidence to conclude that there is something inherently different about the [±plural] feature in these languages. Instead, this data points more directly to an issue with the *distribution* of features in combination with other features and how this distribution compares cross-linguistically. This raises the question, which Lardiere (2009b, p. 212) herself poses, which is to what extent and under what conditions are features able to be disassociated from the lexical items in which they are found in their L1 and L2? The inability of an L2 learner to dissociate

features from their lexical items would suggest that L2 acquisition consists of learning the appropriate combination of features in the target language that determines the structure of lexical items.

There are, however, serious concerns over Lardiere's proposal to leave parameters by the wayside (Travis, 2008; Liceras, 2009; Montrul and Yoon, 2009). Researchers such as Travis (2008) and Montrul and Yoon (2009) warn that although features have the power and flexibility to offer a more fine-grained view of differences in language (both cross-linguistically and within a single language), the study of features without parameters offers an apparently endless set of possibilities, which brings us back to the initial problem that the Principles and Parameters theory was meant to solve. Liceras (2009), like Travis (2008), poses serious concerns over the rejection of parameters because they do not 'cover language-specific characteristics (and even idiosyncrasies)' of properties in different languages, as in the case of Chinese *-men* and Korean *-tul* (p. 283). Although Liceras admits that L2 learners indeed must undertake the task of remapping feature distribution in their target language, she questions why this should be more important than L2 learners' access to a more general and fundamental structure of the language (which she, following Baker (1996), refers to as the 'soul' of the language). Liceras (1997, 2009) argues that while the focus in the field of SLA may have shifted over the course of the past few decades from parameters to functional categories to features, these components of linguistic theory do not stand in a relationship of complementary distribution, but rather one of dependency.

The important take aways from this debate on features is that the lack of specificity when it comes to defining a parameter has led some researchers to suggest that perhaps it is time to put the study of parameters aside in favor of descriptions of lexical items and functional categories based in their feature composition (Travis,

2008; Lardiere, 2008, 2009b). However, without the parameters framework, we are left with serious concerns over learnability (Liceras, 1997, 2009; Travis, 2008; Montrul and Yoon, 2009). How can L2 learners cope with apparently endless possibilities of feature combinations? What happens to structure and representation? These questions and related issues are addressed throughout the remainder of this dissertation.

4.4 Multiple Grammars

As can be seen in the previous sections, much of the research concerning L2 linguistic representation in acquisition has approached the acquisition process as one of resetting, eliminating, or restructuring non-target properties of the IL to move *away* from the L1 *toward* the L2. More recent research, especially concerning optionality (Sharwood-Smith and Truscott, 2005; Truscott and Sharwood-Smith, 2004; Truscott, 2006; Sorace, 2011), bidirectional transfer (Pavlenko and Jarvis, 2002), L2 to L3 transfer (De Angelis, 2007; Foote, 2009), and even studies on language attrition (Montrul, 2008) has provided evidence suggesting that a strict interpretation of the traditional generative-based approaches to SLA, which assert a linear path of acquisition that moves progressively toward a target-like L2 grammar, do not fully explain the reality of the L2 acquisition path.

The shortfalls indicated above have lead to the emergence of the Multiple Grammars (MG) theory, originally proposed by Roeper (1999) as *Universal* or *Theoretical Bilingualism*. The MG theory is one of language representation and acquisition first proposed as a way to account for seemingly contradictory grammatical rules existing simultaneously in the developing grammars of children during the L1 acquisition process as well as instances of optionality that exist as part of stable adult gram-

mars. Amaral and Roeper (2014) extend this model to describe the interlanguage representation of second language learners and bilingual speakers in general.

The MG theory does not deviate drastically from the Full Transfer/Full Access theory advocated by Schwartz and Sprouse (1994, 1996), mentioned in section 4.2, in terms of the initial state of L2 acquisition and the availability of UG to constrain developing IL grammars. However, the manner in which the new system is acquired deviates dramatically (with the exception that both theories assume that UG is available to fully restrict the acquisition process of L2 speakers).

In first language acquisition, MG follows Minimalist theory in assuming that there is a Minimal Default Grammar (MDG) that comprises the initial state of language learning, which is supplied by the Language Acquisition Device (LAD) (Roeper, 1999; Amaral and Roeper, 2014). For second language acquisition, Amaral and Roeper (2014) assume the initial state of L2 learners proposed by the Full Transfer/Full Access hypothesis (Schwartz and Sprouse, 1996) in which the initial state for a learner's L2 grammar consists of the L1 final state. In both L1 and L2 acquisition, where the initial state cannot sufficiently analyze the language input, the learner has access to all aspects of UG. However, Amaral and Roeper (2014) do not clearly state what is meant by the *initial state*. They state that they follow Schwartz and Sprouse (1996) in assuming that the initial state of the L2 is the end state grammar of the L1; however, based on the theory they espouse, the end state grammar of the L1 cannot be strictly limited to the grammatical rules of the fully formed adult language. That is to say, according to MG, rules and sub-grammars are never erased or re-written, though they may dwindle in productivity.[1] Therefore, the end state of the L1 according to the MG theory is not simply what is considered the "correct", "native-like", or productive grammar of the L1; rather the end state of the L1 consists of all the

[1]This aspect of the theory is supported by fMRI evidence from internationally adopted children that display neural activation when exposed to their L1 despite having no conscious memory of the language (Pierce et al., 2014).

sub-grammars that have been activated during that speaker's lifetime, including the MDG (again with varying degrees of productivity).

Additionally, for all subsequent languages, the initial state of language acquisition (whether it be L1, L2, or *Ln*) consists of *all* grammars that exist in the learner's interlanguage. For L1 acquisition, the grammar that exists is the MDG, for L3 learners, the grammars that have been posited in both the L1 and L2 acquisition processes would be available. In this way, the definition indicates that MG is able to account for the initial stage of any type of language acquisition and forms a more comprehensive theory for language acquisition and use.

4.4.1 MG in L1 Acquisition

The concept of MG, or Theoretical Bilingualism, in its original construct (Roeper, 1999, 2011) emerged based heavily in the Minimalist Theory of syntax presented by Chomsky (1995, 2005). This forms the basis of one of the main tenets of Multiple Grammars Theory, to avoid complex rules. Therefore, rather than have a large grammatical rule with exceptions, such as *English is a non-pro-drop language except in informal registers with perception verbs in the matrix clause*, the speaker posits two separate rules in their linguistic representation. This representation can be used to explain phases that children pass through as they acquire their native language. Roeper (1999) provides an example of a stage that many children pass through in which they simulataneously produce both "I want" and "me want". He suggests that these two forms represent two different structures in the child's grammar. Neither structure is ever deleted from the child's mental representation; however, the child will begin to abandon the form that shows no agreement as they enter school and into adulthood as this form is socially considered a pre-school style grammar. In this

way, Roeper posits that the abandonment of a grammar may be motivated by social factors, separate from the grammar itself.

Roeper (1999, 2011) observes that even monolingual children receive contradictory input. For example, as mentioned in the previous paragraph, English is in its essence a non-pro-drop language, which is to say that it requires obligatory subjects; therefore, as sentence like in (52) is perfectly grammatical; whereas the sentence in (53) is not.

(52) It was raining yesterday.

(53) * Is snowing today.

However, there is a possibility to delete the subject in an informal social register, especially with perception verbs, as in (54) and (55) below:

(54) Sounds terribly dull.

(55) Smells like cookies in here!

The child initially is open to both pro-drop and non-pro-drop options. Over time, input provides evidence that pro-drop in English is restricted to a small class of verbs and is never allowed in embedded clauses:

(56) * He knows looks good to me.

The child then determines that the non-pro-drop parameter is productive in their language, while pro-drop is lexically limited.

When it comes to the acquisition of grammatical gender, children have a variety of cues that they can employ to determine the gender of a new item. Children rely on noun external distributional properties, principally syntactic agreement relations, and noun internal distributional properties, mainly morphological properties but also

semantic (i.e., biological) gender cues in the case of human referents (Gagliardi, 2012). Previous studies of grammatical gender assignment in French and Spanish have shown that children rely most heavily on syntactic cues to assign gender to a novel noun; however, morphological shape of the invented word influences determiner selection until age five (Karmiloff-Smith, 1979; Pérez-Pereira, 1991).

From a MG perspective, children learning a gendered language like Spanish have multiple rules for gender assignment, such as:

Rule A. Words ending in *-a* belong to the feminine noun class category.

Rule B. Words that correspond with the determiner *la* belong to the feminine noun class category.

Rule C. Words that are modified by feminine adjectives belong to the feminine class category.

The child employs rules such as these to determine the grammatical gender of a new word, but as input will make clear, there are often exceptions, as illustrated in (57), (58), and (59) below.

(57) El mapa viejo está en la mesa.
The$_{sg.masc}$ map old$_{sg.masc}$ is on the table
The old map is on the table.

(58) El agua fría sale del grifo.
The$_{sg.masc}$ water cold$_{sg.fem}$ flows from-the faucet
The cold water flows from the faucet.

(59) La silla grande se rompió.
The$_{sg.fem}$ chair big$_{sg.inv}$ RFLX.PRON broke
The big chair broke.

The example in (57) runs contrary to the rule postulated in **A**, as *mapa* is masculine even though it ends in -a. The child must learn that *mapa* is masculine

by relying on syntactic cues rather than phonological ones. In example (58) we see that *agua*, a feminine word, takes a masculine determiner in the singular form for phonological evolutionary reasons. The child will ascertain from the input that feminine nouns that begin with a tonic /*a*/ take a masculine determiner, and will postulate a new rule in their grammar to account for the input. Finally, the rule asserted in **C** does not account for instances where the adjective is invariable for gender, such as in (59). Here the child will have to look to other cues to assign the appropriate gender to the new word.

The examples above illustrate that there is no one singular reliable cue that tells the child the gender of a new word they encounter in the input. The child must pay attention to the various cues available and, based on the input, children will intuitively form a heuristic to order the cues from most to least reliable. Although children acquiring languages like Spanish or Portuguese will quickly learn that syntactic agreement relations are the most reliable cues to resolve the grammatical gender of a new word, they will not completely abandon morphological or semantic cues to help determine gender, which can be used in cases where syntactic agreement is not informative, such as in (60) and (61).

(60) Mi pelota azul
My$_{sg.inv}$ ball blue$_{sg.inv}$
My blue ball

(61) Tu estudiante está aquí.
Your$_{sg.inv}$ student is here
Your student is here.

In (60), if the child has never heard the word *pelota* before, the only cue that the child has to the grammatical gender of the word is the morphology, as the determiner and modifier in this case are not informative. In (61), the interlocutor

requires contextual cues, such as an indication to the student in question, to assign proper grammatical gender to the noun. In this case, the biological gender of the student will inform the grammatical gender of the noun *estudiante*.

4.4.2 Extending MG to SLA

As mentioned previously, generative-based theories traditionally hold the view that the interlanguage of an L2 learner is a system of representation in which the L2 is acquired through a process of restructuring. The initial (L1) grammar progressively changes into other grammars as it is restructured 'away from the L1 grammar' (White, 2003b, p. 61). In this way, the Full Transfer/Full Access theory advocated by Schwartz and Sprouse (1994, 1996) is seen as a system in which each step of the acquisition process consists of L2 input building on the L1 grammar and constrained by UG as it step-by-step moves toward the target grammar. White (2003b) presents a visual representation like that in Figure 4.1 to illustrate this process.

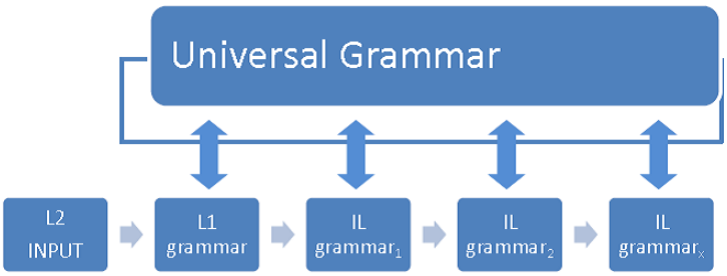

Figure 4.1: Full Transfer / Full Access IL Representation

In each step of the acquisition process, the previous grammar is replaced by a new grammar until a stable end state of L2 is reached. Importantly, this representation only progresses *forward*, continually moving toward the L2.

Amaral and Roeper (2014), on the other hand, propose that there is no re-setting of parameters or restructuring/reanalysis of linguistic features or rules that attempt to move away from the L1 grammar and towards the L2 grammar. Instead,

they argue that 'any human grammar is made up of multiple sub-grammars, and the interlanguage of L2 speakers will not be any different' (p. 9).

According to the MG perspective, features may be added to the interlanguage (IL) repertoire that may be similar to or distinct from the ones that already exist there but the new rules will not replace the old ones. When a language learner first embarks on the task of acquiring a second language, their IL is comprised of some rules that come from the Minimal Default Grammar (MDG), others that come from the L1, and others still come from both. The new L2 input is analyzed with a rule that already exists in the IL if there is one; however, if the L2 input cannot be analyzed with a previous rule in the IL, the learner's system will have to posit a new rule, aided by full restriction from UG. The relative size and productivity of these rules may shift with a learner's continuing linguistic experiences. Input from the L1 and L2 will influence the development and productivity of various rules in a speaker's IL. Therefore, instead of the L2 learner moving steadily away from the L1 grammar, the IL amasses more grammatical rules from the L2 input, without ever deleting rules from the L1 or rules erroneously posited in the learning process; the productivity of these rules may grow or dwindle depending on input and language use at any point of the acquisition process. This accounts for what many bilingual speakers experience as they may go through periods where one language is used significantly more than the other.

The MG thoery attempts to account for evidence of non-linear acquisition paths and provide a more comprehensive explanation for the extensive instances of optionality found in L2 speakers. However, the theory as it is posited by Amaral and Roeper (2014) lacks precision. Lardiere (2014) notes that though Amaral and Roeper (2014) assert that rules must be simple, they lack precision in defining what is meant by a *rule* in MG theory. Lardiere (2014) implores that we more precisely

define the terms 'rule', 'simple', and 'productive' in order to better formulate theories and predictions of language learning.

4.4.3 Nonlinear Acquisition

The MG theory addresses many issues that arise in empirical acquisition data such as the extensive instances of optionality found in L2 speakers. Generative-based theories focus on restructuring and parameter/feature resetting as the method of acquisition in L2. If this were indeed to be the case, it is unclear why instances of optionality would exist at all. If a learner were able to reset a parameter or a feature, then as soon as they are able to produce that new aspect of the L2, these theories would argue that that parameter/feature has been reset and in theory the L2 learner should not be showing instances of optionality. One solution is that these generative-based theories could postulate optional rules in each step of the restructuring process to account for optionality and, although that is a viable solution, it does not follow the parameter/feature resetting hypotheses that they espouse.

Additionally, a strict interpretation of many generative-based theories, such as the Full Transfer / Full Access theory (Schwartz and Sprouse, 1994, 1996) have difficulty accounting for instances of attrition, language loss, or increased instances of optionality. According to these theories, cases of non-target optionality should only decrease as the L2 speaker advances through the acquisition process. Many L2 speakers have experienced periods where they do not use their L2 (perhaps in the form of an extended vacation back to their native country or taking some time off from their academic studies). In these cases, L2 speakers often note that when they return to using their L2 there is a period of readjustment where they must regain pieces of their L2 that have been 'lost' (or perhaps better stated, inactive) during the time that they were not using it. Instances of language attrition are also common

among heritage speakers, who often experience attrition of properties of their L1 as they gain fluency and education in their L2 (Montrul, 2008, 2010). Generative-based theories have no way to account for this; notice that in the visual representation in 4.1, there is no arrow that moves 'backward' toward the L1.

MG theory, like the FT/FA theory of Schwartz and Sprouse (1994, 1996), assumes that native-like attainment of the target language is theoretically possible; however, this often does not fully occur due to competing productive rules from the L1, insufficient input in the L2, or other extralinguistic factors. Unlike FT/FA and other generative-based theories, MG provides a theory that more accurately reflects the fluid nature of second language acquisition. As with the example of the child Spanish language learner, L2 speakers must ascertain the cues of gender agreement and learn to properly order them based on their productivity and reliability. L2 learners' struggle with gender agreement may be due to insufficient input to properly establish this system as well as competition from their L1 agreement rules rather than any inherent structural deficit in the learners' representations.

4.5 Formalizing Multiple Grammars

The Multiple Grammars framework provides a promising theory to address some of the theoretical obstacles produced by prolonged cases of optionality, instances of bidirectional transfer, development patterns in L3 acquisition, and L1 attrition; however, as Lardiere (2014, p. 41) points out, the theory as laid out by Amaral and Roeper (2014) does not provide a theoretical definition to specify what is meant by a *rule* in their assertion that a theory of acquisition should 'avoid complex rules' (p. 3). The lack of a formalized definition of linguistic *rule* in MG theory creates problems

when it comes to explaining two of the important pilars of MG as it pertains to L2 acquisition: Optionality and Productivity.

This dissertation explores Second Language Acquisition through the lens of feature (re-)assembly, as proposed by Lardiere (2008, 2009a,b) and incorporates the proposal offered by Carroll (2009) in response to Lardiere (2009b) suggesting that features in constraint-based theories may offer a more elegant account to address feature re-assembly in SLA. These issues are situated within a Multiple Grammars framework (Roeper, 1999, 2011; Amaral and Roeper, 2014), integrating a Head-Driven Phrase Structure Grammar (HPSG) approach (Pollard and Sag, 1994; Sag et al., 2003) to address more precisely what is meant by a *grammar rule*.

There are several important aspects of the MG theory that shall be addressed here using HPSG as the formal model. First, the MG theory insists that in SLA, learners have full access to Universal Grammar (UG) to restrict their developing new grammar. Second, learners do not posit complex rules that contain exceptions or multiple provisions; instead, when faced with input that is incompatible with their existing grammar rules, they posit a new rule (or rules) to account for the new input. Next, the existence of optionality in second language grammars, as noted by Sorace (2000), is the result of different *rules* posited by the speaker, which can be explained through feature structure hierarchies and feature constraints in the L1 and L2. Finally, Amaral and Roeper (2014) suggest that the existence of multiple contradicting rules in the grammar results in an observable asymmetry between production and comprehension. Each of these issues is addressed in turn in the following sections.

4.5.1 Universal Grammar

As mentioned in section 4.4, the MG theory assumes the same initial state as Schwartz and Sprouse (1994, 1996) in the Full Access/Full Transfer Hypothesis, though they

follow Dekydtspotter et al. (1998) and White (2003a) in suggesting that the term *Full Restriction* might be more apt to describe the role of Universal Grammar in SLA. When it comes to UG, HPSG makes many of the same assumptions as the Minimalist approach (Chomsky, 1981a, 1986, 1995). UG is an inventory of universal constraints that are pre-programmed in all humans that allows for the acquisition of any natural human language. These constraints in HPSG can be classified along the following three criteria: (i) universals of linguistic ontology, which is the inventory of universally available sorts of linguistic entities, together with a specification of their appropriate attributes and their value sorts; (ii) universal schemata, which are a small, fixed inventory of universally available phrase types, such as the head-complement structure; and (iii) universal constraints on well-formed phrases, such as the Head Feature Principle or the Subcategorization Principle (Pollard and Sag, 1994, p. 58).

All natural languages must follow these universal constraints. Therefore, "mistakes" in acquisition are the result of inappropriate feature selection or unspecified feature values in the learner's representation. Though learner utterances may fail to be 'native-like' because of non-target feature assembly, they should never violate the universal constraints.

In the acquisition of a particular grammar, a learner (of L1, L2, or Ln) must acquire the particular system of lexical entries (the lexicon) of that language as well as select and further articulate the linguistic ontology and the schemata from the universal linguistic ontology and the universally available schemata, respectively (Pollard and Sag, 1994, p. 58).

4.5.2 Avoiding Complex Rules

As Carroll (2009) points out, complex feature sets have been put forward since at least as far back as the 1960s (Greenberg, 1966) to solve issues in linguistic description:

> [T]o eliminate redundancy in the statement of phrase structure rules, to capture cross-categorial generalizations, and to simplify the number and types of linguistic rules.
>
> (Carroll, 2009, p. 246)

This is one of the advantages of a framework such as HPSG that allows for an elimination in redundancies in the lexicon as well as in phrase structure rules by stipulating an architecture that allows for the cross-classification of words according to shared properties. Generic lexical entries serve to specify constraints that must hold for all specific lexical entries that are objects of the generic entry (Pollard and Sag, 1994, p. 36). In this way, HPSG stipulates that a phrase consists of a lexical head along with whatever specific information that lexical head requires, which is specified in the lexicon (Sag et al., 2003, p. 94).

By providing a lexicalized, constraint-based system that incorporates morphosyntactic (CATEGORY), semantic (CONTENT), and discursive (CONTEXT) information, we are able to account for examples that are "lexically limited, not entirely productive, and not very numerous" (Amaral and Roeper, 2014, p. 4) that speakers of any given language must account for without a proliferation of rules and sub-rules.

Following Lardiere (2008, 2009b), we shift the focus away from an investigation of parameters, which she has stated (and this author agrees) are distracting at best. Instead, here it is argued that the MG theory should take feature assembly as the central focus of the theory. The proposal here is to define a *rule*, as put forward by Amaral and Roeper (2014), as a constraint on feature assembly as defined and classified in HPSG (Pollard and Sag, 1994, p. 58). By adopting a constraint-based framework in which linguistic entities are classified by universal linguistic ontologies, schemata, and constraints on well-formed phrases, the assertion of Amaral and Roeper (2014) that MG must 'avoid complex rules' essentially becomes an unnecessary tenet.

What Amaral and Roeper (2014) consider a *rule* here is reformulated as a *constraint* in HPSG, which could be a universal constraint, that applies to all languages, such as the Head Feature Principle (asserted in example (31) in Chapter 3), or a language-specific constraint that describes a particular phenomenon of that language, such as the Zero Copula Constraint (Sag et al., 2003, p. 462), illustrated in Figure 4.2, which is found in languages like Russian and African American Vernacular English (AAVE).

$$\begin{bmatrix} \textit{phrase} \\ \text{SYN} & \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{verb} \\ \text{FORM} \quad \text{fin} \end{bmatrix} \\ \text{VAL} \left[\text{SPR} \left\langle \right\rangle\right] \end{bmatrix} \\ \text{SEM} & \begin{bmatrix} \text{MODE} \quad \text{prop} \\ \text{INDEX} \quad \boxed{2} \end{bmatrix} \end{bmatrix} \rightarrow \boxed{1}\text{NP} \begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{HEAD} \left[\text{PRED} +\right] \\ \text{VAL} \left[\text{SPR} \left\langle \boxed{1} \right\rangle\right] \end{bmatrix} \\ \text{SEM} & \left[\text{INDEX} \quad \boxed{2}\right] \end{bmatrix}$$

Figure 4.2: Zero Copula Constraint

Likewise, Amaral and Roeper (2014) do not clearly define *sub-rules*, though it can be deduced that they are referring to points in the grammar where optionality exists as part of the adult steady state or idiosyncratic lexical entries or classes of idiosyncratic expressions. Using HPSG, the poorly defined *sub-rules* of Amaral and Roeper's MG theory are replaced by derivational and lexically specified constraints. In the lexeme hierarchy, each type has constraints associated with it; of these, some are *inviolable* and must be adhered to, while others are *defesasible* and can be overridden by a conflicting specification.[2] This hierarchy allows us to account for the fact that a given lexeme may have many properties in common with other lexemes and yet may differ along a particular constraint that overrides the general constraints that govern its supertypes (Sag et al., 2003, p. 234).

A focus on feature constraints provides framework in which it is possible to address real world data, which can be messy. Let us use pro-drop as an example.

[2]In AVM descriptions, the symbol '/' is used to indicate that a certain specification is defeasible.

Amaral and Roeper (2014, p. 13) divide Spanish and English by their pro-drop status, noting that Spanish is productively pro-drop while English allows pro-drop with certain lexical forms (namely perception verbs); they cite English as productively non-pro-drop with Spanish requiring overt subjects in certain contexts. However, while Roeper (1999, 2011) notes that cases of pro-drop are permitted in English in informal registers and with certain verbs, evidence such as that in (62), (63), and (64) suggests that at least some cases of pro-drop in English are really defined contextually rather than lexically.

(62) - Where's Mary?
- *Already left.*

(63) *Can't go tomorrow, how about Thursday?*

(64) *Ain't nothin' you can do about it.*

Verbs like *leave*, *go*, and *be* in English do not allow pro-drop as readily as perception verbs like *seem* or *smell*; however, examples (62), (63), and (64) illustrate that it is possible to find them in a pro-drop context and we need to be able to account for such instances however rare they may be. By defining pro-drop contextually as well as lexically, we can account for these cases as pro-drop can occur with just about any English verb given the appropriate context. Additionally, by defining instances of pro-drop contextually, we can better explain Brazilian Portuguese data, which retains the null expletive, as in examples (65) and (66) as well as null pronominal use in impersonal constructions (67), though the null referential subject is disappearing, as evidenced in examples (68), (69), and (70) below (Kato, 1999, p. 4).

(65) Tá chovendo.
Is raining
It is raining.

(66) Tem novidade.
Have news
There is news.

(67) Aqui pode fumar.
Here $can_{3per.sg}$ smoke
You/One can smoke here.

(68) **pro* / Eu como pizza.
**pro* / I eat pizza
I eat pizza

(69) **pro* / Ele come pizza.
**pro* / He eats pizza
He eats pizza.

(70) **pro* / A gente come pizza.
**pro* / the folks eat pizza
We (folks) eat pizza.

The data from Brazilian Portuguese makes it difficult to determine whether it should be considered productively pro-drop or not. Therefore, placing contextual constraints on the realization of null and overt subjects provides for a more complete theory.

To account for the pro-drop status of a language, certain lexical constraints can be placed on the description of the pronouns themselves via appropriacy conditions (Pollard and Sag, 1994, p. 318). In HPSG, the value of the RESTRICTION attribute of a nominal object, located along the CONTEXT path, is a set of parameterized states-of-affairs (*psoas*), which restrict the possible anchors of indices. These BACKGROUND psoas should be considered as felicity conditions on the utterance context (Pollard and Sag, 1994, p. 27). For instance, in English, the background psoa corresponds to the presupposition that *she* must be female (as described in Figure 4.3), which is how HPSG captures the fact that English is a 'natural gender' language.

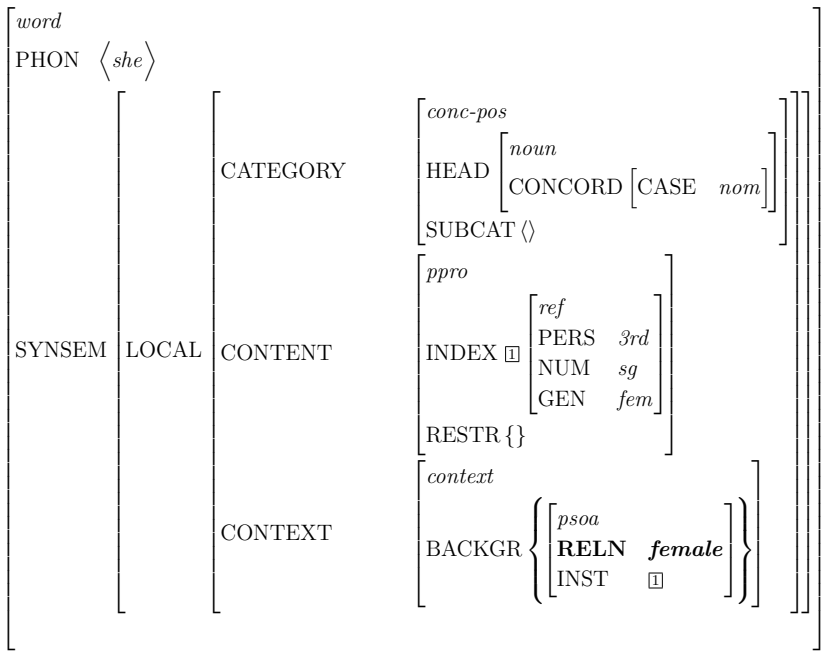

Figure 4.3: AVM diagram for *she*

'Grammatical gender' languages, like French, Spanish, and Portuguese, on the other hand, do not have this same restriction on feminine pronouns. For example, the French feminine nominal pronoun *elle* does not introduce the same BACKGROUND psoa as English: the referent of *elle* does not need to be female, it could be an inanimate object that is grammatically feminine (Pollard and Sag, 1994, p. 27). Spanish, however, has a different restriction on nominal pronouns: the use of the feminine nominal pronoun *ella* is generally only considered felicitous in cases where the speaker wants to emphasize the subject (in cases of contrast, clarification, or a change in subject, for instance). Therefore, it can be specified with the RELATION value of the BACKGROUND attribute that this pronoun is only felicitous in such cases, as illustrated in the description for *ella* provided in Figure 4.4.[3]

[3]This solution clearly requires a more fine-tuned analysis to define the appropriacy conditions (Pollard and Sag, 1994, p. 318) for the use of overt subject pronouns in Spanish. For the time being, the analysis is left as-is to provide the reader with a general understanding of how these constraints can work on the lexical level, the details of this particular analysis are outside the scope of the current investigation.

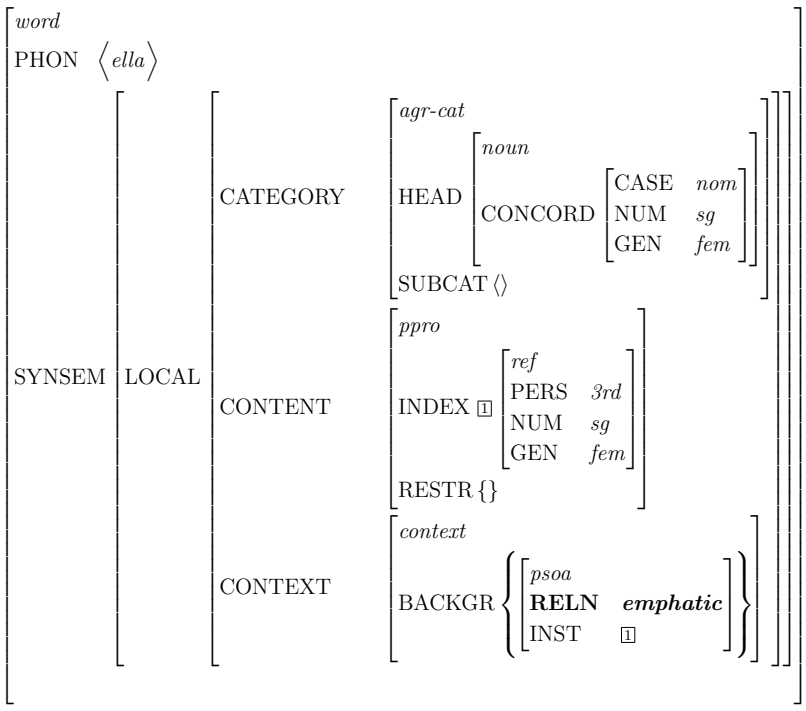

Figure 4.4: AVM diagram for Spanish nominal pronoun *ella*

HPSG assumes that for a pro-drop language, like Spanish, there is a single null pronoun, which is completely unspecified for agreement. The agreement values are supplied by the verbal forms and/or via contextual information. This approach not only eliminates redundancies by having to posit multiple null pronouns with various agreement specifications, but it also provides the appropriate pronominal form for a typical phrase that requires a referential pronoun. The differences in the lexical descriptions of the pronouns lead to the appropriate pronouns used for English (71) and Spanish (72).

(71) Mary always gets good grades. She studies a lot.

(72) María siempre saca buenas notas. Estudia mucho.
María always gets good grades *pro* studies much
María always gets good grades. She studies a lot.

Similar constraints can be imposed for pronouns in Brazilian Portuguese that require that they are bound to a referent, but the existence of *pro* in the lexicon allows for null subject use with expletive and impersonal functions.

4.5.3 Optionality in the Interlanguage

Amaral and Roeper (2014) suggest that adding new features and rules (which we can now refer to instead as constraints) to a learner's grammatical repertoire in order to account for linguistic phenomena not present in their existing grammatical knowledge may lead to instances of optionality in the L2. This study focuses on cases of syntactic optionality, which Sorace (2000, p. 93) defines as:

> Coexistence within an individual grammar of two or more variants of a given construction, which: (1) make use of the same lexical resources; and (2) express the same meaning.

She notes that, while optionality is present in both L1 and L2 developing grammars, there are three main differences that set L2 acquisition apart from L1 when it comes to optionality (p. 97). First, L2 learners have an additional source of optionality from their native language. Second, non-target optionality tends to persit until advanced competence levels (Papp, 2000). Third, Sorace states that optionality seems to be 'real' in the sense that L2 speakers use optional variants in the same contexts; however, this does not mean that optionality is unconstrained (Sorace, 2000; Prévost and White, 2000).

The gender feature allows us to investigate optionality in the IL of speakers who do not have this feature in their L1. As the data presented in Chapter 6, section 6.1 indicates, L2 Spanish / L1 English speakers show higher rates of producing noun phrases that violate Spanish gender constraints compared to Native Spanish and L2

Spanish / L1 BP speakers. These cases, as in example (73) from a participant in the L2 Spanish / L1 English group, have conflicting gender feature values for the determiner and the modifier.

(73) La taplina amarillo
The$_{fem}$ taplina yellow$_{masc}$
The yellow taplina

Previous literature in both L1 and L2 acquisition of grammatical gender suggests that agreement with determiners comes in before adjectives, and that before adjectival agreement emerges, learners often employ the masculine singular form of the adjective (Stoel-Gammon, 1976; Hooper, 1980; White et al., 2004). In L1 acquisition, we can hypothesize that the lexical entry for an adjective, for example, *amarillo* ('yellow'), in the early stages has a GENDER attribute as part of the child's MDG, however, the values for this attribute are yet to be determined, in which case their representation can be described by the AVM diagram in Figure 4.5.

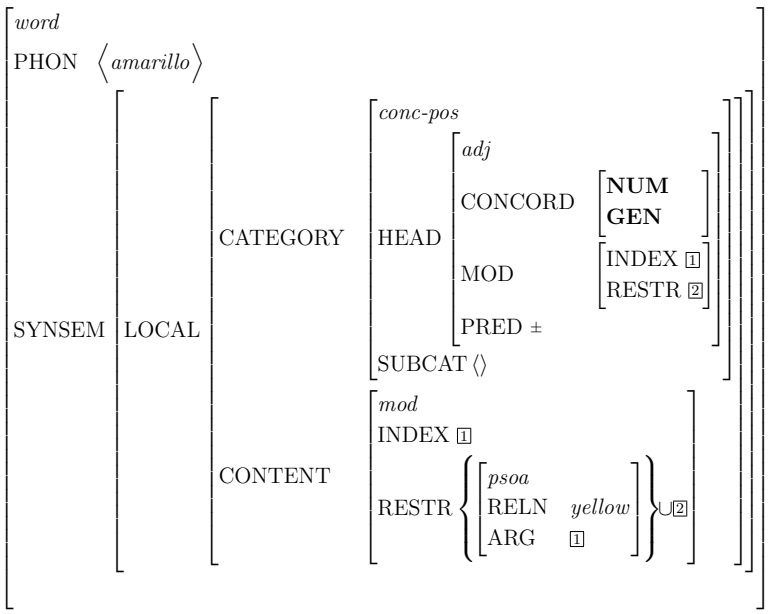

Figure 4.5: Early L1 AVM description for *amarillo* ('yellow')

A very early representation for an L2 learner (L1 English), on the other hand, does not have a CONCORD attribute, as adjectives in English are not located along the concord part-of-speech (*conc-pos*) path. The description for the L2 early adjectival representation is presented in Figure 4.6. Although the representation of the adjective at the early stages of L1 and L2 acquisition differs, the production result is predicted to be the same, where the learner employs the masculine singular form of the adjective as though it were the invariable form, like an English adjective.

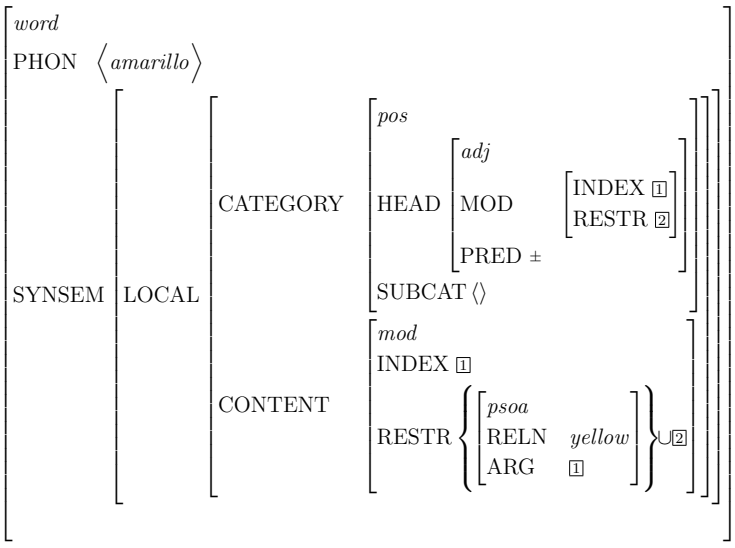

Figure 4.6: Early L2 AVM description for *amarillo* ('yellow')

As the L2 Spanish learner continues developing their L2, they are predicted to select GENDER as a CONCORD feature and reassemble their *part-of-speech* (*pos*) path so that adjectives are found within the sort *conc-pos* along with determiners and nouns. This is not to say that once the L2 learner's representation includes adjectives along the *conc-pos* path with GENDER as a feature of this path that they will no longer produce errors. Once speakers have reassembled *adjectives* to fall along the *conc-pos* path, they may initially pass through a period of acquisition similar to the L1 Spanish learner in which they have selected the features, but not yet acquired the feature values, as in Figure 4.5. Yet even when the speaker has established the feature

values for adjectives, non-target optionality in this domain may continue to persist, perhaps indefinitely, as Amaral and Roeper (2014) assert that the rules of the L1 are still present and active, even as the L2 continues to develop. To reformulate that statement within an HPSG framework, the feature structure of the learner's L1 still exists as it did before; however, on top of that representation the learner is building a second representation for Spanish. This is to say that L2 Spanish / L1 English speakers have conflicting feature structures in their two languages. Even at advanced stages of proficiency, the L1 grammar may cause even momentary instances where the speaker permits a noun phrase, or part of a noun phrase to be formed without the gender feature, following the feature structure of English. The feature structures for both languages are presumed to be connected in the IL and as such we can predict interaction between the constraints of the two languages, which could result in a variety of other bilingual phenomena in addition to non-target optionality (e.g., bidirectional transfer). This aspect of the MG theory is in line with the Morphological Underspecification Hypothesis (MUSH) proposed by McCarthy (2006, 2008), which asserts that L2 errors are the result of underspecification of feature values, rather than feature clash.

4.5.4 Comprehension-Production Asymmetry

There have been numerous studies debating the nature of the production-comprehension asymmetry in both L1 and L2 acquisition (Snyder, 2007; Tasseva-Kurktchieva, 2008; Pickering and Garrod, 2013; Amaral and Roeper, 2014; Turrero-García, 2016). Though there is a good deal of debate as to what the root cause of this asymmetry is, most scholars agree that language learners are more conservative in their production than in comprehension. For instance, Snyder (2007, p. 184) notes that L1 Spanish speaking children never employ preposition-stranding while L1 English speaking children

never use pied-piping in prepositional questions. Moreover, among the English speaking children there is a statistically significant gap between when children begin using both PPs and direct object *wh* questions and when they begin to form prepositional questions, indicating that the existence of an avoidance stage in children's acquisition for this phenomenon.

The MG theory predicts that, while conservatism is specifically employed in production (Snyder, 2007), the opposite is true for comprehension. A lack of conservatism in comprehension provides an opening to observe conflicting grammars within a single speaker (Amaral and Roeper, 2014, p. 23). This is particularly useful for the SLA researcher to understand the various grammar rules that a learner employs at different levels of acquisition. Here, let us take as an example, nominal agreement. Spanish and English both employ CONCORD agreement within the Noun Phrase; however, the constraints differ markedly as English unifies CONCORD values only on determiners and nouns; whereas Spanish also has CONCORD values on adjectives. Additionally, GENDER is a value for CONCORD in Spanish, but not in English. Therefore, we can predict that early L1 English / L2 Spanish learners may not notice the ungrammaticality of a phrase such as that in (74).

(74) * La pupitre pequeño
The$_{fem.sg}$ desk$_{masc.sg}$ small$_{masc.sg}$
The small desk

Since GENDER is not a feature of CONCORD in English, the discord between the feminine determiner *La* and the masculine adjective *pequeño* may not register as the constraints that the learner has in their L1 for producing Noun Phrases do not involve this feature. That is to say, in the English representation there is no place for GENDER values as NUMBER is the only CONCORD feature; therefore, since the number values

for all the elements of the phrase in (74) are singular, the phrase is grammatical if we employ the English grammar constraints.

Conversely, in English, when referring to an entire family, the last name is morphologically marked when pluralized; however, in Spanish, the last name of a family is invariable, illustrated in examples (75) and (76).

(75) I saw the Hamiltons last week.

(76) Vi a los Hamilton la semana pasada.
I-saw (DOM) the$_{pl}$ Hamilton$_{inv}$ the week last
I saw the Hamiltons last week.

Early L2 learners may initially have difficulty accounting for the input in (76) because it seems to violate NUMBER agreement.[4] Once the learner is able to assign a *plural* number value to uninflected names, they will be able to interpret this information without difficulty.

[4]This difficulty could be measured by setting up an ERP experiment. We would expect that early in an L2 learner's development they would exhibit a large N400 effect, whereas this effect would be reduced among highly advanced speakers.

CHAPTER 5

METHODOLOGY

This research investigates acquisition of the gender feature in Spanish. This feature was chosen specifically because, as Kirova (2016, p. 3) states:

> Gender is not a purely syntactic feature, but rather an interface feature that is represented morphologically, syntactically and lexically; hence, its acquisition should hinge on a number of factors, not exclusively the (un)availability of the UG.

The complex nature of the gender feature makes it an ideal feature to study within a theory of language acquisition focused on feature assembly. To that end, this study manipulates syntactic and morphophonological gender cues on nonce words as a way to better understand how native and non-native speakers represent this feature in their IL. Three subject groups participated in this study. The first group is comprised of native Spanish speakers to serve as the control for the study. The second group is made up of L2 Spanish / L1 Brazilian Portuguese (BP) speakers because not only do they have grammatical gender in their L1, but it is hierarchically organized in the feature-structure hierarchy in the same way as Spanish. Therefore, this group should, theoretically, produce native-like gender agreement in their L2.

The third group consists of L2 Spanish / L1 English speakers. These speakers do not have grammatical gender as a feature of nouns in their native language; therefore they need to incorporate this feature into their IL and subsequently learn how it is assembled in the target language in order to produce native-like agreement.

5.1 Research Questions and Hypotheses

There are five research questions that guide the investigation of feature assembly as it pertains to the gender feature in Spanish. These questions address issues of L1-L2 comparative typology, syntactic and phonological gender cues, and gender assignment strategies in native and non-native speakers of Spanish.

Research Question 1: Do L1 Brazilian Portuguese (BP) / L2 Spanish speakers assign grammatical gender to new nouns like L1 Spanish speakers do?

Hypothesis 1: L1 BP / L2 Spanish speakers assign gender in their L2 like L1 Spanish speakers. Seeing as the feature structure hierarchy for Spanish and Portuguese is identical when it comes to gender and constraints on gender agreement relations are the same in both languages, L1 BP speakers employ their L1 constraints when assigning gender to a novel noun in their L2, using gender information from determiners and modifiers to assign target gender.

Research Question 2: Are L1 English / L2 Spanish speakers able to derive gender information from syntactic agreement relations (i.e., the determiner and modifier) to assign gender to novel nouns?

Hypothesis 2: L1 English / L2 Spanish speakers are able to use gender information from syntactic agreement relations to assign gender to novel nouns; however, morphophonological form is predicted to be a stronger cue for L1 English speakers because gender is only a feature of nouns and pronouns in English. Therefore, they

will more often use the gender cues of the noun itself, rather than employ information from the determiners and modifiers.

Research Question 3: Does a learner's L1 have an effect on the types of errors they make?

Hypothesis 3a: L2 speakers can perform target gender agreement operations, regardless of L1. Although errors on gender agreement are predicted to be largely errors of lexical assignment, rather than syntactically malformed phrases for all speakers; a learner's L1 will have an effect on the types of errors produced. When L1 BP speakers produce non-target phrases, they are predicted to only produce errors of assignment; whereas L1 English speakers are predicted to make a small but significant number of errors in the syntactic constraints on gender agreement.

Hypothesis 3b: When errors are the result of a break down in the syntactic structure, they are predicted to occur in cases of the greatest complexity, where morphophonological and syntactic features collide and point to different gender conclusions; and, in the case of L1 English speakers, these breakdowns are predicted to occur at points where the nominal agreement hierarchy most differs from their L1 hierarchy (i.e., in adjectival agreement).

Research Question 4: Does the presence of the gender feature in a speaker's L1 facilitate their retention of novel noun gender in their L2?

Hypothesis 4: Once Spanish and Portuguese speakers have specified a noun for gender, they will be able to maintain that gender when asked to describe the item a few minutes after its initial presentation. Since their L1 requires that all nouns are specified for gender, they are accustomed to retaining gender information of new words they learn. English speakers, on the other hand, do not mark nouns in their L1 for gender and, therefore, they are predicted to be less accurate in gender retention.

Research Question 5: Does a speaker's L1 affect how they process anaphoric agreement with nonce nouns?

Hypothesis 5: Spanish and Portuguese speakers employ structure sharing between the determiner and the nonce noun; therefore, we expect to see no differences in reading times for the anaphoric null nominal. English speakers, on the other hand, use morphophonological cues in their gender assignment strategy; thus we expect to see a surprise effect around the anaphoric null nominal segment when the grammatical gender of the noun is not congruent with the morphophonological form (e.g., *la fulipo*).

5.2 Experimental Methods

Three tasks are employed to examine the questions posed in the previous section. These tasks utilize novel nouns to investigate grammatical gender; there are several reasons for this choice. First, invented nouns allow for the avoidance of confounds concerning frequency of exposure. It is impossible to know how familiar L2 speakers are with specific lexical items that already exist in the language; for example, one student may hear their professor use the word *pupitre* 'desk' on a daily basis, while another student is only aware of the word *escritorio* with this meaning. Second, the use of novel nouns eliminates the possible explanation that has been cited in the literature (e.g., White et al., 2004) that gender errors made by L2 speakers that have gender in their L1 are the result of *confusion* between the two languages, such as in cases of heterogeneric nouns. For example, in Spanish, the word for *milk* is feminine (*la leche*), whereas in Portuguese, the word is masculine (*o leite*).[1] Finally, by using nonce nouns it is possible to easily manipulate the morphophonological form of the noun while keeping everything else about the situation constant. Again, when using nouns that already exist in a language it is impossible to find a group of L2 speakers

[1]See section 2.2 for more examples and discussion.

that have had the same exposure to any given noun, much less when we try to compare nouns that differ in morphophonological form. It is possible to put together a group of nouns that end in *-o*, *-a*, and *-e* for masculine and feminine genders (e.g., *la mano, la noche, la silla, el mapa, el coche, el libro*); however, it is impossible to know how well a speaker knows these different words, and therefore it makes comparisons across forms unreliable. By using nonce nouns, it is possible to ensure that every participant has the exact same exposure to each noun and hears / reads the same cues for each item.

All experimental items used in this investigation contain a novel noun that is three syllables and phonotactically Spanish. None of the nonce words invented have an *m* before the final vowel to avoid the *-ma* ending in the transparent feminine and deceptive masculine cases, as approximately 40% of words with this ending are masculine in Spanish (Teschner and Russell, 1984). Great care was taken to avoid other strongly associated gender noun endings that are not the canonical *-o* masculine / *-a feminine* endings, such as *-aje*, which is strongly correlated with masculine gender, or *-umbre*, which is highly associated with feminine gender (Teschner and Russell, 1984).

The list of nonce words were presented in their morphophonologically neutral form (i.e., ending in *-e*) to a group of native Spanish speakers who were asked to rate each word on a Likert scale for gender (1 = definitely masculine, 5 = definitely feminine). All words ultimately used for the experimental trials had an average score that fell between 2.5 and 3.5 and any words that had an average rating outside this range were discarded. Additionally, the native Spanish speaking raters were asked to make a note if they felt any of the words strongly resembled words that already exist in the Spanish lexicon; these words were also discarded. The final list of words was

divided arbitrarily into two groups to be used in each of the experiments conducted in this study.

The first of the two experiments incorporates two distinct tasks: one focuses on speakers' ability to interpret and produce target gender; the other is designed to test gender retention among the participants. The interpretation and production task requires that participants listen to stories containing novel nouns and respond to a question about each story; the questions are designed in such a way that participants necessarily must produce the novel noun in a noun phrase with a determiner and adjective in their response. The retention task involves asking participants to describe the novel items after each set of six stories, in doing so they mark determiners and adjectives for gender.

The second experiment investigates gender processing by way of a Self-Paced Reading (SPR) paradigm, originally introduced by Just et al. (1982). Participants read sentences with an anaphoric null nominal (e.g., *la roja* 'the$_{fem}$ red$_{fem}$ (one)') which refers to a novel noun antecedent and reading times are recorded to better understand how speakers are processing gender in these cases. The following sections provide details for each of these experiments.

5.2.1 Participants

There are three participant groups for this study: one native control group and two L2 learner groups; each group consists of twenty-four speakers. All subjects participating in this study are over the age of eighteen and completed all three tasks in the study.

The L1 Spanish speaker group consists of twenty-four (n=24) native speakers of Spanish between the ages of 19 and 52 (mean age 30) split between men (n=13) and women (n=11). All speakers identify Spanish as their first and dominant language

and were raised and educated in Spanish in a Spanish-speaking country until adulthood. Participants were tested in Amherst, Massachusetts, the majority of which were professionals on a short-term stay in the US for a professional development series. The others were graduate students who recently arrived to the University of Massachusetts Amherst to begin a graduate program. The mean duration of stay in the US at the time of testing is four months.

The L1 BP speaker group contains twenty-four (n=24) L2 high-intermediate Spanish speakers who identify Portuguese as their first and dominant language, raised and educated in Brazil. Of the participants in this group, seven (n=7) are men and seventeen (n=17) are women. The ages of the participants range between 20 and 39 years old (mean age 26). All L1 BP participants are Spanish language learners enrolled, at the time of data collection, in Spanish language courses at the Universidade Federal de Rio de Janeiro or at the Universidade Federal de Juiz de Fora in Brazil where data was collected.

The L1 English group is comprised of twenty-four (n=24) L2 high-intermediate Spanish speakers who self-report that English is their first and dominant language. There are five (n=5) men and nineteen (n=19) women in this group, all of whom have been raised and educated in the United States and are between 18 and 25 years of age (mean age 20 years). All participants in this group are Spanish language learners enrolled in 300- and 400-level Spanish courses at the University of Massachusetts Amherst at the time of data collection. Data for this group was collected at the University of Massachusetts Amherst.

Both L2 Spanish groups completed a Spanish proficiency assessment to ensure that at the time of testing they had a high-intermediate level of Spanish. The assessment is a modified version of the DELE Proficiency Test authored by Montrul (2012).[2]

[2]The full proficiency assessment can be found in Appendix A.

All participants scored between 20 to 35 points on the proficiency assessment, which is considered high-intermediate.

5.2.2 Experiment 1: Production & Retention

The first of the two experiments is designed to test interpretation, production, and retention of grammatical gender on novel nouns. In order to keep participants' focus away from the grammar, the purpose of the experiment was masked as a memory study, probing L2 speakers' ability to remember the names and locations of new items in their second language.

Eighteen short (15-20 second) stories were designed and presented using PowerPoint. Each story presented the participants with two of the same novel object in a scene, each time introduced with an indefinite determiner and differing along a single attribute denoted by a gender-inflected adjective and situated in two distinct locations within the scene. An example of the scene that participants see is included in Figure 5.1 along with the text of the story that they hear in (77).

(77) Pilar dejó un taplino rojo en el sofá y luego dejó un taplino amarillo en el suelo. Se usan para mantener el libro abierto. Fíjate en su ubicación.
English translation: *Pilar left* a_{masc} red_{masc} *taplino on the sofa and then she left* a_{masc} $yellow_{masc}$ *taplino on the floor. They are used to hold books open. Pay attention to their location.*

When the first object is introduced, the written name appears at the top of the screen, as illustrated in Figure 5.1. This was done to ensure that participants get the proper phonetic interpretation of the nonce noun, to avoid cases where the participant hears the input presented in example (78), but misparses the phonetic string.

TAPLINO

Figure 5.1: Sample Story Scene

(78) **Input:** Una raganto

Output: Un *araganto*

Additionally, each object in the scene appears when it is mentioned in the narration. At the end of each story, participants see a 3-2-1 countdown on the screen, then the original scene reappears without the target objects. The participants then listen to a question asking for the object from a specific location (e.g., *¿Qué estaba en el suelo?* 'What was on the floor?').

Six versions of the experiment manipulate nonce noun gender (Masculine / Feminine) and morphology (Transparent (*-o* masc / *-a* fem), Neutral (*-e* masc & fem), Deceptive (*-a* masc / *-o* fem)) in a 2 x 3 Latin Square design, generating the conditions in Table 5.1.

		Morphophonology		
		Transparent	**Neutral**	**Deceptive**
Gender	**Masculine**	El taplin**o**	El tapline	El taplin**a**
	Feminine	La taplin**a**	La tapline	La taplin**o**

Table 5.1: Experimental Conditions

After every six stories, participants were presented with a description task for each of the novel items from the situations they had just heard. In the same order they were presented in the stories, participants saw an image of the novel objects one at a time, this time without the rest of the scene, as illustrated in Figure 5.2. Participants were asked to provide a short description of the item. The name of the item was displayed at the top of the screen with no determiner or modifier in order to test participants' ability to retain noun gender of a new item.

TAPLINO

Figure 5.2: Example Retention Item

Before the task began, participants were given a description of the task in their native language in the consent form that they signed. Then, when they sat down at the computer to begin the experiment, they were given instructions a second time, this time in Spanish. After the instructions in Spanish, participants were given two training stories and two practice description tasks to ensure that they understood what they were being asked to do.[3] Participants spent ten to twenty minutes com-

[3]See Appendix B for task instructions and Appendix C for a full list of experimental items.

pleting both tasks of the first experiment. Their audio responses were recorded and saved by participant number for further coding and analysis.

5.2.3 Experiment 2: Self-Paced Reading

After completing the first experiment, participants were asked to fill out a questionnaire in Spanish concerning their linguistic background.[4] This provided a short break from the experimental tasks but allowed participants to maintain Spanish-mode. Once participants completed the questionnaire, they began the second task. The description of this task was initially provided in the participants' native language in the consent form that they filled out before they began the first experiment. When participants sat down to begin the second experiment, instructions were provided in Spanish, followed by a three-item practice trial to allow participants to familiarize themselves with the task and ask any questions they may have.

The goal of the second experiment is to further investigate how native and non-native Spanish speakers are able to take their knowledge of grammatical gender rules (i.e., their linguistic competence) and employ it in real time (i.e., linguistic performance). As with the first experiment, the second experiment manipulates novel noun gender and morphophonology in a 2 x 3 Latin Square design, as illustrated in the previous section in Table 5.1. This experiment implements a Self-Paced Reading (SPR) paradigm using the platform OpenSesame (Mathôt et al., 2012). In this type of experiment, participants read sentences, divided into segments in a region-by-region (rather than word-by-word) presentation, pushing the spacebar to move from one segment to the next. The OpenSesame program records the reading times (in ms) of each segment to examine if the experimental manipulations have an effect on reading times (which is taken as indication of processing ability).

[4]See Appendix for sample Questionnaire.

The independent variables are participants' L1 (Spanish, BP, or English); noun gender (Masculine / Feminine); and noun morphophonology (Transparent (*-o* masc / *-a* fem), Neutral (*-e* masc & fem), Deceptive (*-a* masc / *-o* fem)). The dependent variables are the reading times for each segment of the experimental items and offline affirmation evaluation (True/False) responses. This experiment, like the first, has six versions. Each version contains eighteen test items and thirty-six fillers, randomized in their presentation. The fillers contain nonce words as nouns, verbs or adjectives. Both experimental and filler sentences are divided into seven segments and followed by a Ture/False statement regarding the sentence immediately preceding it.[5] All experimental items are constructed along the formula presented in example (79).

(79) NP | verb1 | nonce | verb2 | Null Nominal | spill-over | wrap-up

There are six versions of each experimental item to allow for all possible combinations of gender and morphophonology. Each participant sees only one of the six sentences for a specific item, but sees an equal number of each of the conditions. A sample of the six conditions is presented in Table 5.2 with the sentence *Miguel wants a firen***x**, *(he) prefers the red (one) that is on the table.*

TM:	Miguel	quiere	un fireno,	prefiere	el rojo	que está	en la mesa.
TF:			una firena,		la roja		
NM:			un firene,		el rojo		
NF:			una firene,		la roja		
DM:			un firena,		el rojo		
DF:			una fireno,		la roja		

Table 5.2: Self-Paced Reading Sample Conditions

After reading the target sentence, a True/False affirmation evaluation, such as the one in example (80), which corresponds to the Transparent Masculine (TM) condition, appears in blue text that ensures that participants are interpreting the

[5] A full list of experimental items can be found in Appendix E; the full list of fillers is presented in Appendix F.

sentences properly. The gender and morphophonology of the nonce word in the True/False affirmation is always consistent with those in the experimental phrase.

(80) Miguel prefiere el fireno rojo en la mesa.
Miguel prefers the$_{masc}$ fireno red$_{masc}$ on the table
Miguel prefers the red fireno on the table.

All experimental items require a *True* response to be counted as correct. Participants were told to press a red button on the left side of the keyboard (covering the 's' key) to indicate a false response and a green button on the right side of the keyboard (over the keyboard's 'l' key) to signal a true response. To aid participants in choosing the proper button, red and green circles were presented on the left and right side of the screen, respectively, with the left circle reading *falso* 'false' and the green circle reading *verdadero* 'true', illustrated in Table 5.3.

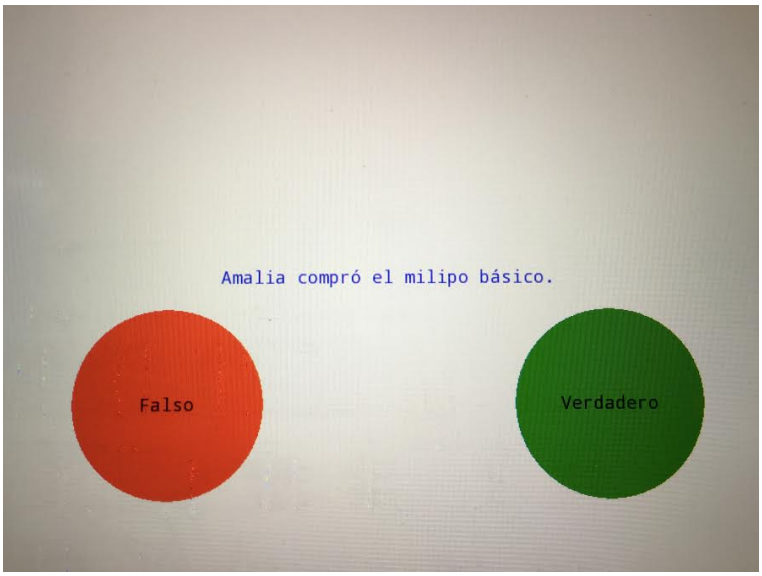

Figure 5.3: Sample SPR Affirmation Evaluation

These experiments were conducted in university offices at the University of Massachusetts Amherst (for the L1 Spanish and L1 English group), the Universidade Federal de Rio de Janeiro, and the Universidade Federal de Juiz de Fora (for the L1 BP group).

5.3 Coding

5.3.1 Coding Production Data

Responses to each of the production task questions are classified as either target, non-target, or avoidance. There are several ways that participants can produce Target and Non-Target responses; these different types of responses along with examples are presented in Table 5.3.

Code	***Sample Input***	***Sample Response***
Target		
Det & Adj	Un taplino amarillo	*un taplino amarillo*
	Un efarne plástico	*un efarne verde*
Det only	un coifete amarillo	*un coifete*
	un figote morado	*un figote de color morado*
Adj only	una goltape roja	*goltape roja*
Non-Target		
Misassigned	un taplina amarillo	*una taplina amarilla*
Ungrammatical		
Incorrect Adj	una coifeto amarilla	*una coifeto amarillo*
Incorrect Det	una jocone redonda	*un jocone redonda*
Avoidance		
Under-informative	una volapo roja	*volato*
	un yoleñe pintado	*yoleñe marrón*
No response	una narape amarilla	*Uh... no sé.*
	una davina negra	ø
Other	un empeta largo	*la cosa larga*

Table 5.3: Examples of Production Coding

Target responses are those in which participants produce syntactically accurate grammatical gender agreement that is consistent with the grammatical gender of the novel noun presented in the story. The most informative of the target responses is the **Det & Adj** category which contains both a gender-inflected determiner and adjective that agree with the target gender of the nonce noun from the story. The category **Det only** is applied to phrases where the only informative gender inflection of the phrase is found on the determiner. This could mean that the participant omitted the adjective altogether (e.g., *un coifete* **ø**), that the adjective is not inflected for gender (e.g., *un efarne* ***verde***), or that the participant replaced the adjective with a periphrastic prepositional phrase (e.g., *un figote* ***de color morado***). It is important to note that this category contains cases where the adjective is uninformative for gender; however, instances where the adjective is incorrectly inflected for gender are coded as non-target. Target responses may also be categorized as **Adj only** in which the adjective is the only gender-inflected element in the phrase. While in this category we could potentially find determiners that do not inflect for gender (e.g., ***su***), data from this experiment are only of the type where the determiner is omitted (e.g., **ø** *goltape roja*). Again, as with the **Det only** category, this category does not contain cases where the determiner is incorrectly inflected for gender.

Non-Target responses are comprised of two main types: Misassigned or Ungrammatical. Participant responses are categorized as **Misassigned** when there is no syntactic violation between the determiner and the modifier (i.e., the determiner and the adjective match for gender) but the gender of the determiner and modifier is not the same as the gender presented with the nonce noun in the input (e.g., input: *un taplina amarillo* → output: *una taplina amarilla*). Responses are coded as **Ungrammatical** when there is a syntactic violation between the determiner and modifier. In these cases, it can either be the adjective that is non-target (e.g., input: *una coifeto*

amarilla → output: *una coifeto amarillo*) or the determiner that is non-target (e.g., input: *una jocone redonda* → output: *un jocone redonda*).

Avoidance responses are those that provide no gender information of any kind. Participants may produce responses that are **under-informative**, whereby they may just produce the nonce noun on its own or a nonce noun with an uninflected adjective (e.g., *yoleñe marrón*). A lack of response altogether or a responses such as *'no sé'* (I don't know) is also coded as avoidance.[6] Lastly, there is the category of **Other**, in which we find instances of replacing the nonce noun with a known noun (e.g., *la* ***cosa*** *larga* 'the long **thing**') or other responses that do not fit in the categories above.

5.3.2 Coding Retention Data

The purpose of the retention study is to investigate the effect of L1 on noun gender retention rates. The prediction in this study is that L1 Spanish and L1 BP / L2 Spanish speakers are likely to retain noun gender at higher rates than L1 English / L2 Spanish speakers because they are assumed to encode the grammatical gender of a new word along with other linguistic information (e.g., phonetic, semantic) about the novel item due to the fact that these speakers have a feature value for gender on nouns in their native language, whereas L1 English speakers do not. Therefore, coding for each retention response is dependent upon the responses from the production part of the study. Consequently, all items that were coded for **Avoidance** in the production task of the experiment were discarded in the retention task.

Results for the retention task are divided into three categories: **Same** (i.e., gender from production response retained), **Divergent** (i.e., gender differs from pro-

[6]Here it is important to recognize that some participants have legitimately forgotten the name of the object or do not remember the information necessary to answer the question; one may then argue that this is not truly avoidance. It seems, however, that teasing apart true cases of avoidance from cases of forgetfulness is a nearly impossible task and, in the end, not particularly informative for the purposes of this study.

duction response), and **Avoidance** (i.e., gender is not produced). Within each of these categories, participants' original responses from the production task can be either Target or Non-Target, as illustrated in Table 5.4.

RETENTION	PRODUCTION: Target	PRODUCTION: Non-Target
Same	ST	SN
Divergent	DT	DN
Avoidance	AT	AN

Table 5.4: Examples of Retention Coding

Therefore, if the gender agreement relations that a participant employs in the description task are the same as those that the participant used when responding to the production tasks, even if the original production response was Non-Target, it is coded as 'retained'. Likewise, if a participant does not employ the same gender agreement relations in the description task as they did in the production task, including cases where the gender used in the description task matches the target gender of the nonce item, the description is coded as 'divergent'.

5.3.3 Coding SPR Data

In the Self-Paced Reading Study, each press of the space bar presents the next segment of text; the time between presses is recorded, providing the reading time (in ms) for that particular segment. Reading times are recorded for all segments of the sentence as well as for the off-line Affirmation Evaluation. Mean reading times for each segment are calculated and compared across conditions and across participant groups. The segments of particular interest to this study are the third, fourth, fifth, and sixth segments, illustrated below in (81); these are the segments in which the nonce noun is introduced (3rd segment) and the anaphoric null nominal is presented (5th segment),

as well as their respective spillover segments (4th and 6th) as spillover effects are well attested in the SPR literature (Kaiser, 2014).

(81) Seg-1 | Seg-2 | **Seg-3** | **Seg-4** | **Seg-5** | **Seg-6** | Seg-7
Miguel | quiere | un fireno | prefiere | el rojo | que está | en la mesa.
Miguel | wants | a fireno | (he) prefers | the red (one) | that is | on the table.

Average reading times for each condition are compared within each group; longer reading times are taken as an indication of a processing lag. L1 English speakers are expected to show a processing lag around the null nominal (segment 5) in the deceptive morphophonological conditions, as English speakers are predicted to rely more heavily on morphophonological cues to assign gender to the novel noun. If this prediction holds true, L1 English speakers are likely to interpret the feminine nonce noun *una fireno* as masculine because *fireno* has the canonical masculine ending *-o*. In this case, L1 English speakers should demonstrate a surprise effect (i.e., processing lag) when they come to the feminine null nominal. L1 Spanish and L1 BP speakers are not expected to demonstrate this same effect as they assign gender using the syntactic information provided on the determiner; as such, when they arrive at the null nominal, the antecedents gender is already appropriately specified and no surprise effect should be seen.

Responses to the off-line Affirmation Evaluation responses are coded as either correct or incorrect. The Affirmation Evaluation is presented to ensure that participants are paying attention to the meaning of the target sentence and have interpreted it as intended; therefore, sentences corresponding to incorrect Affirmation Evaluation responses are discarded.

The following chapter presents the empirical data from the experimental tasks described here in the current chapter. The results are presented by experiment and by task, beginning with production task results from all three groups together, followed

by a break down of these results within each group, concluding with a brief analysis connecting these results to the corresponding research questions. The retention results are presented next, first presenting the results of all three groups together, followed by an analysis of the results for each speaker group, and the results are addressed in relation to the corresponding research question. Finally, the results from the SPR experiment are presented, comparing the results across and within speaker groups. A full discussion of the results and their implications in Multiple Grammars theory follows in Chapter 7.

CHAPTER 6

RESULTS AND ANALYSIS

The findings from the two experiments presented in Chapter 5 provide insight as to how native and non-native adult Spanish speakers assign gender to novel nouns. The hypotheses put forward in Section 5.1 are partially confirmed by the data. The results from the two experiments also yield some unexpected outcomes, which are addressed here in this chapter.

6.1 Production Results

The goal of the production task is to determine whether L2 Spanish speakers use gender cues to assign gender like L1 Spanish speakers and whether the availability of the gender feature in the L1 facilitates native-like agreement. To this end, responses for all three speaker groups are initially divided into two categories: *target* or *non-target* and presented and analyzed in this section. Non-target responses are then categorized by type of error. Errors across speaker groups are compared to determine whether L2 speakers with differing L1s produce the same types of errors. White et al. (2004) suggest that L2 gender errors produced by speakers who have grammatical

gender in their L1 are the result of confusion between their L1 and L2. If this is indeed the case we would expect to find no significant differences between the L1 Spanish and L1 BP groups in assigning gender to nonce nouns in Spanish. The discussion of the production results begins with a general overview of the target responses from all three groups, followed by a break-down and classification of the Non-Target Responses, and concludes with an analysis of results by group.

6.1.1 All Groups

In Figure 6.1, the target responses of all three participant groups (L1 Spanish; L1 BP / L2 Spanish; L1 English / L2 Spanish) are reported by condition (Transparent, Neutral, or Deceptive morphophonology and Masculine or Feminine grammatical gender). Target responses are those that include at least one gender inflected element in the Noun Phrase that corresponds with the grammatical gender of the nonce noun presented and no elements that contradict that gender.[1] That is to say, if the target noun phrase is *Un figote morado* (a_{masc} $purple_{masc}$ figote), and the participant responds: *Un figote de color morado* (a_{masc} figote of color purple) this is coded as target because, although the modifier is no longer informative for gender, the modifier indicates that the phrase is masculine. Conversely, a response of *Un figote morada* is coded as non-target because the adjective does not agree with the determiner and it is not consistent with the target gender of the item. Each condition has a total of seventy-two possible responses per participant group. The total number of correct responses for each condition are illustrated in Figure 6.1 for all three participant groups.

It can be seen clearly in Figure 6.1 that all participant groups display the highest target response rates in the Transparent and Neutral Masculine conditions,

[1] See Chapter 5.3.1 for an in depth coding explanation.

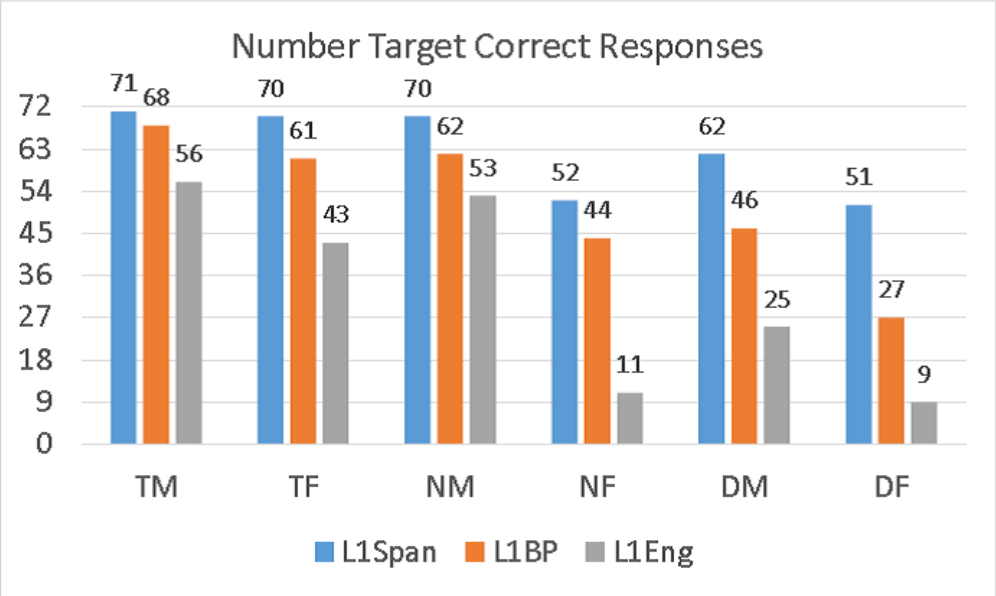

Figure 6.1: Target Gender Responses for All Groups

with the Transparent Masculine (TM) condition yielding the highest accuracy rates for all groups. L1 Spanish speakers perform at ceiling in the Transparent morphological conditions as well as the Neutral Masculine condition; however, there is a notable decline in performance in the cases where masculine gender is deceptively marked as well as for non-transparently marked feminine conditions. Even with the decline in performance, L1 Spanish speakers' accuracy rates are sill well above chance in all conditions (the lowest accuracy rate, found in the Deceptive Feminine condition, still yields 51 (of 72 total) target gender responses, that is 70.8% accuracy).

Although L1 BP speakers, predictably, do not perform quite as well as L1 Spanish speakers in this task, their performance is not markedly different from L1 Spanish speakers in the Transparent and Neutral morphological conditions. However, there is a steep decline in comparative performance in the Deceptive morphological conditions. As with the results for L1 Spanish speakers, the Deceptive Feminine condition yields the lowest accuracy rates for BP speakers, yet unlike L1 Spanish

speakers, these accuracy rates are well below chance, producing only 37.5% target gender responses.

Results from the L1 English speakers indicate a greater difficulty in producing target gender in general. Like the BP and Spanish speakers, English speakers perform best in the Transparent Masculine condition, however, their accuracy rates, at 77.8%, are significantly lower. Additionally, the overall results suggest that assigning feminine gender is more challenging for L1 English speakers when compared with BP and Spanish speakers. The transparent morphology seems to facilitate target gender agreement, as when feminine nonce nouns are transparently marked (-*a*), L1 English speaker accuracy rates are at 59.7%, whereas when the nonce nouns are marked with neutral morphology (-*e*) accuracy rates plummet to 15.3%.

The data of all three groups were analyzed using a multiple linear logistic regression model (Baayen, 2008) in the statistical computing environment R, version 3.1.1 (RStudio Team, 2015). The model is calculated to predict participants' target responses (1 = target; 0 = nontarget) based on L1 and Condition, as well as their interactions with L1 Spanish and the Transparent Masculine condition as the reference levels. Error strata is specified to account for individual participant results per condition. The model that was evaluated is provided in (82).

(82) glm(Target ~ L1*Condition + Error(Participant/Condition), data = data, family = "binomial")

No interaction effects are found between L1 and Condition; therefore, a second analysis was performed as a multiple regression without the interaction analysis. Those results are summarized in Table 6.1. A Hosmer Lemeshow goodness of fit test was implemented (X-squared = 4.9824, df = 8, $p = 0.7595$), whose results indicate that our model is a good fit for the data as there is no significant difference between the model and the observed data ($p > 0.05$).

	β	**S.E.**	**Wald z**	**Significance**
L1				
BP	-2.117	0.299	-6.165	**<0.001**
English	-9.663	0.196	-12.982	**<0.001**
Condition				
TF	-1.691	0.307	-3.142	**0.002**
NM	-2.004	0.319	-1.711	0.087
NF	-4.836	0.297	-9.305	**<0.001**
DM	-7.715	0.295	-7.143	**<0.001**
DF	-5.676	0.301	-10.765	**<0.001**

Table 6.1: Generalized Linear Regression Results

The results of the linear regression indicate significance at the 5% threshold for L1 (both English and BP), as well as for every experimental condition with the exception of the Neutral Masculine condition. As mentioned above, the reference level for condition in the multiple regression analysis is the Transparent Masculine condition, indicating that participants respond to these two conditions similarly. In the following sections, the results for each participant group are investigated and analyzed by condition as well as by the types of non-target responses.

6.1.2 L1 Spanish Response Results

As to be expected, L1 Spanish speakers display high accuracy rates in assigning novel noun gender in all conditions. However, we see from the results presented in Table 6.2 and visually in Figure 6.2 that although these results suggest that native Spanish speakers rely most heavily on syntactic cues to assign gender, this is not to say that they are not influenced by other gender assignment cues.

	Target	Misassigned	*Adjective	*Determiner	Avoid
TM	71	1	0	0	0
TF	70	2	0	0	0
NM	70	2	0	0	0
NF	52	20	0	0	0
DM	62	9	1	0	0
DF	51	19	2	0	0

Table 6.2: L1 Spanish Production Responses by Type

A paired-samples t-test was conducted to compare Target gender responses in each of the gender and morphological conditions. There is no significant difference in target gender responses for the Transparent Morphology conditions, TM and TF, ($p = 0.79$). However, a significant difference in target gender responses is found within the Neutral Morphology conditions, NM and NF, ($p < 0.001$) as well as for the Deceptive Morphology conditions, DM and DF, ($p = 0.0016$).

Manipulation of nonce noun morphology yields the smallest effect in the masculine gender conditions. Comparing these conditions, no significant difference is found between the Transparent and Neutral conditions, TM and NM, ($p = 0.79$), nor are significant differences found between the Neutral and Deceptive conditions, NM and DM, ($p = 0.0641$). Significance at the 0.5 level is found between the Transparent and Deceptive conditions, TM and DM, ($p = 0.0345$).

The morphophonology of feminine nouns has a greater effect L1 Spanish speakers' target gender accuracy. Within the feminine conditions, there is a statistically significant difference for Transparent and Neutral conditions, TF and NF, ($p < 0.001$) as well as between the Transparent and Deceptive feminine conditions, TF and DF, ($p < 0.001$). However, there is no statistical significance in target gender responses for the Neutral and Deceptive feminine conditions, NF and DF, ($p = 0.79$).

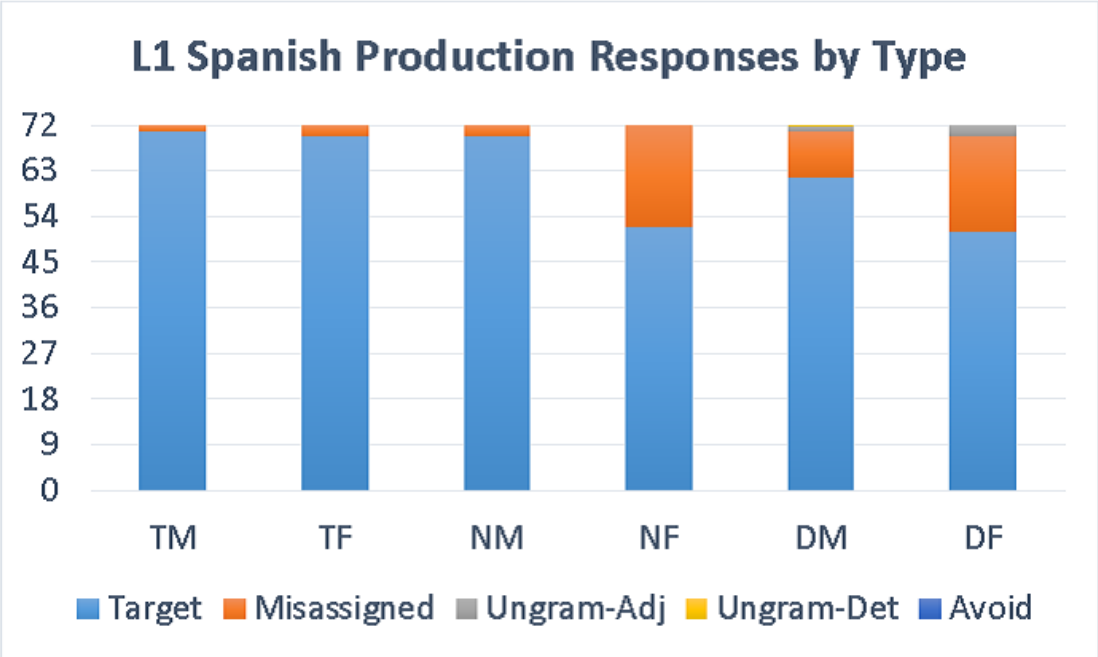

Figure 6.2: L1 Spanish Production Responses by Type

L1 Spanish speakers did not use avoidance in a single instance during this task. However, there were three instances of ungrammatical utterances as it pertains to gender. In all three of these ungrammatical utterances, the participants produced a target gender determiner with a non-target adjective modifying a novel noun in one of the Deceptive Morphological conditions. These ungrammatical utterances are reported in Table 6.3.

Target Sentence	**Participant Utterance**
DF: Una taplino amarilla	Una taplino amarill**o** (participant 126)
DF: Una coifeto amarilla	Una coifeto amarill**o** (participant 112)
DM: Un implufa moderno	Un implufa modern**a** (participant 115)

Table 6.3: L1 Spanish Ungrammatical Responses

These errors appear to be performance errors, triggered by the morphology of the nonce noun. Additionally, there were several instances in which the participant ini-

tially produced an ungrammatical sentence and then self-corrected their utterance; these sentences are considered target responses.

When it comes to target responses, L1 Spanish speakers changed the morphology of the nonce noun in the Deceptive conditions and Feminine Neutral condition, but never in the Transparent conditions nor in the Neutral Masculine condition. Of the 52 target responses in the Neutral Feminine condition, seven (13.5%) displayed a morphological change. In the Deceptive Masculine condition, seven of 62 (11.3%) target responses exhibited a morphological change. The highest rates of non-target morphology are found in the Deceptive Feminine condition, where 11 of the 51 (21.6%) target responses showed a change in the noun morphology.

There are two other notable cases of morphology change, found in the non-target responses, reported in Table 6.4. It seems in these cases that participants noted the clash between the syntactic and morphophonological gender assignment cues; however, in their responses they produced the inverse of the cues provided in the initial situation. It may perhaps also be noteworthy that both of these cases come from the Deceptive Feminine condition.

Target Sentence	**Participant Utterance**
DF: Una suntef**o** negr**a**	El suntef**a** negr**o** (participant 103)
DF: Una urseln**o** amarill**a**	Un urseln**a** amarill**o** (participant 112)

Table 6.4: L1 Spanish Gender-Morphology Mix-ups

The results from the L1 Spanish speaker group indicate that native speakers, unsurprisingly, are highly adept at using syntactic information provided in the determiners and modifiers to assign gender to novel nouns. However, the evidence from this task suggests that morphophonology does not play an insignificant role in gender assignment. Additionally, the results from the Neutral morphology conditions suggest that the markedness of the feminine gender is another influencing factor for native

Spanish speakers in gender assignment of novel nouns, as when the noun morphology is not overtly marked, masculine nouns are attributed with the target gender with the same accuracy rates as in the Transparent Masculine condition; however, accuracy rates for feminine nouns are significantly lower. In fact, accuracy rates for Neutral Feminine conditions do not differ significantly from Deceptive Feminine conditions. Therefore, it seems that for feminine gender, transparent morphology facilitates target gender assignment in L1 Spanish speakers; whereas masculine gender is assigned easily to nouns with transparent and neutral morphology and is hindered only by misleading morphological cues.

6.1.3 L1 BP Response Results

Results from the L1 BP speaker group are categorized by response type, summarized in Table 6.5 and visualized in Figure 6.3. L1 BP speakers are able to produce target gender agreement at higher than chance rates for all conditions with the exception of the Deceptive Feminine condition, in which participants misassign the gender of the noun in 40 of 72 (55.6%) experimental items.

	Target	Misassigned	*Adjective	*Determiner	Avoid
TM	68	0	0	0	4
TF	61	4	1	2	4
NM	62	3	0	1	6
NF	44	24	1	1	2
DM	46	22	1	1	2
DF	27	40	1	2	2

Table 6.5: L1 BP Production Responses by Type

A paired-samples t-test was conducted to compare target gender responses in each of the three morphological conditions. The results by morphological condition

resemble those of the L1 Spanish speaker group: there is no significant difference in target gender responses for the Transparent conditions, TM and TF, ($p = 0.16$), yet there are significant differences in the other two conditions. The difference between masculine and feminine gender in the Neutral conditions, NM and NF, is highly significant ($p < 0.001$) as it is with the Deceptive conditions, DM an DF, ($p < 0.001$).

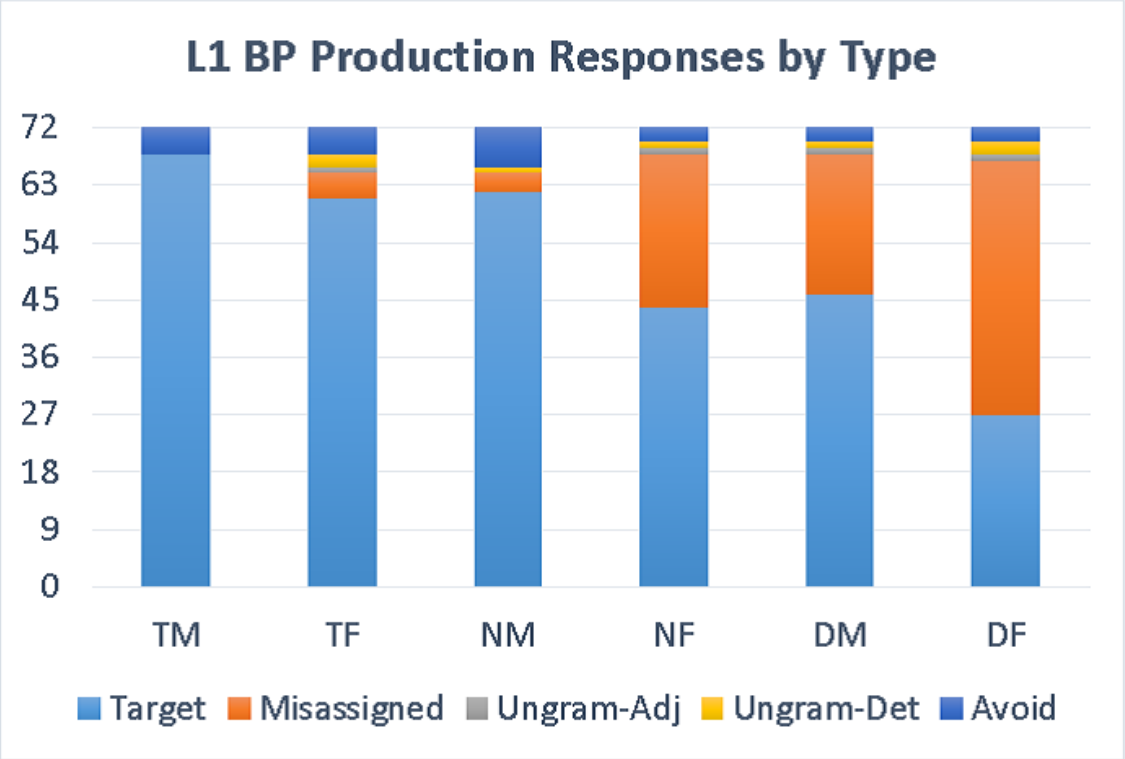

Figure 6.3: L1 BP Production Responses by Type

In comparing the masculine gender conditions, we find no statistical significance between the Transparent and Neutral morphological conditions, TM and NM, ($p = 0.23$). There is a statistically significant difference, however, for Transparent and Deceptive masculine morphological conditions, TM and DM, ($p < 0.001$) as well as between Neutral and Deceptive masculine morphological conditions, NM and DM, ($p = 0.0013$), which was not significant in the L1 Spanish group.

Paired-samples t-tests indicate that there are statistically significant differences between all of the feminine morphological conditions: Transparent and Neutral conditions, TF and NF, ($p = 0.0006$); Transparent and Deceptive conditions, TF and DF, ($p < 0.001$); and Neutral and Deceptive conditions, NF and DF, ($p = 0.0006$). While the Neutral and Deceptive feminine conditions differ from the Transparent feminine condition in the L1 Spanish speakers as well, L1 Spanish speakers do not exhibit a difference between Neutral and Deceptive feminine conditions.

L1 BP speakers avoid producing target gender in 4.6% of responses, distributed fairly evenly across conditions. Participants' avoidance strategies fall into two main categories: (i) uninformative modifiers, such as in examples (83) and (84); or (ii) complete avoidance, either by not producing any determiners or modifiers with the nonce noun, as in example (85) or by not producing the nonce word at all, as in example (86).

(83) Yoleñe marrón
Yoleñe brown$_{inv}$
Brown yoleñe (participant 312)

(84) Efarna de plástico verde
Efarna of plastic green
Efarna of green plastic (participant 321)

(85) Yoleña. (participant 332)

(86) Algo fino que no me recuerdo del nombre
Something fine that not RFLX I.remember of.the name
Something thin that I can't remember the name of (participant 322)

Additionally, L1 BP speakers produce more ungrammatical utterances than L1 Spanish speakers with 11 total ungrammatical statements found in every experimental condition with the exception of the Transparent Masculine condition. In these ungrammatical cases, L1 BP participants were more likely to produce a non-target

determiner than a non-target adjective (which runs counter to the three ungrammatical responses found amongst the L1 Spanish speaker group). Sample ungrammatical utterances are reproduced in Table 6.6.

Target Sentence	**Participant Utterance**
NF: Una jocone redonda	**Un** jocone redonda (participant 316)
NM: Un coifete rojo	**Una** coifete rojo (participant 325)
TF: La quinabra clara	**El** quinabra clara (participant 326)
TF: Una volapa morada	Una volapa morad**o** (participant 333)
NF: La yoleñe pintada	La yoleñe pintad**o** (participant 323)
DF: Una quinabro clara	Una quinapo clar**o** (participant 324)

Table 6.6: L1 BP Ungrammatical Responses

The results from the L1 BP speakers suggest that while L1 BP speakers primarily rely on syntactic cues to assign gender to novel nouns, they give more weight to morphological cues than their native Spanish speaker counterparts. L1 BP speakers not only show the drop in target gender accuracy rates in the Neutral morphology conditions between masculine and feminine, but there is an additional drop in accuracy rates from the Neutral feminine condition to the Deceptive feminine condition. These results suggest that L1 BP speakers' assignment of feminine gender is facilitated by Transparent morphology and is hindered by Deceptive morphology, unlike L1 Spanish speakers for whom feminine gender assignment is facilitated by Transparent morphology but is not additionally hindered by the Deceptive condition.

6.1.4 L1 English Response Results

Results from the L1 English speakers indicate that they do, in fact, assign gender primarily by the morphological shape of the word. As predicted, most non-target responses fall into the misassigned category, in which the gender that speakers assign

to the novel noun in their responses is not the target gender but the gender does not violate gender agreement constraints, as illustrated in example (87).

(87) **Input:** Un taplina amarillo

Output: Una taplina amarilla

Across all conditions, 13% of L1 English speakers' responses were categorized as ungrammatical with the highest rate of ungrammatical gender responses per condition found in the Transparent Feminine condition at 20.8% and the lowest ungrammatical gender responses found in the Transparent and Neutral Masculine conditions with 8.3% each. Taking misassigned non-target responses as grammatical, with no errors in the syntactic agreement constraints, these results are consistent with an impressive body of previous research on L2 gender acquisition that indicate gender grammaticality rates of 80% or higher (Franceschina, 2001b, 2005; Hawkins and Franceschina, 2004; Bruhn de Garavito and White, 2002; White et al., 2004; McCarthy, 2006, 2008; Grüter et al., 2012; Kirova, 2016; among others).

	Target	Misassigned	*Adjective	*Determiner	Avoid
TM	56	6	4	2	4
TF	43	12	7	8	2
NM	53	8	2	4	5
NF	11	47	2	9	3
DM	25	32	2	9	4
DF	9	52	1	7	3

Table 6.7: L1 English Production Responses by Type

A series of paired samples t-tests were conducted to investigate the relationship between syntactic and morphological cues in L2 Spanish (L1 English) gender assignment. Unlike in the rseults for L1 Spanish and L1 BP speakers, there is a statistically significant difference between masculine and feminine gender in all three

morphological conditions: for Transparent morphological conditions, TM and TF, ($p = 0.006$); for Neutral conditions, NM and NF, ($p < 0.001$); and for Deceptive conditions, DM and DF, ($p = 0.0018$).

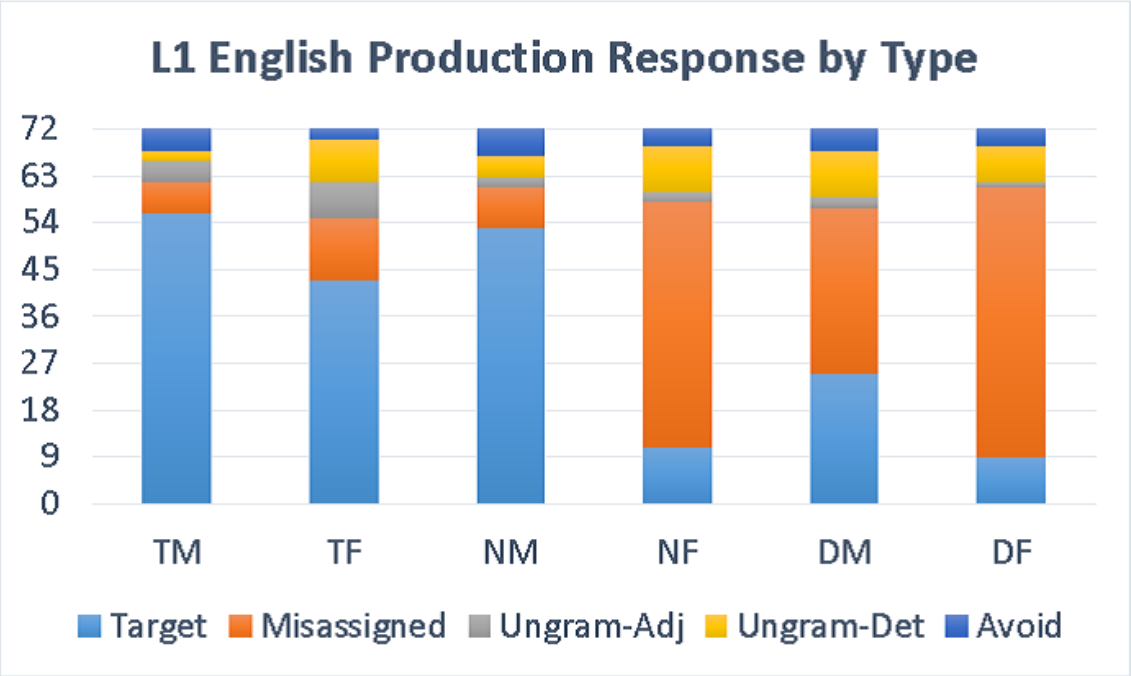

Figure 6.4: L1 Eng Production Responses by Type

A comparison between morphological conditions within each gender variable indicates that, just as with the L1 Spanish and L1 BP groups, there is no statistically significant difference for Transparent and Neutral masculine morphological conditions in L1 English speakers, TM and NM, ($p = 0.43$). However, there is a statistically significant difference for Transparent and Deceptive conditions in the masculine gender, TM and DM, ($p < 0.001$), as well as for Neutral and Deceptive masculine morphological conditions, NM and DM, ($p < 0.001$). These results are similar to those of the L1 BP speakers.

For the feminine conditions, there is a statistically significant difference in Transparent and Neutral Morphology conditions, TF and NF, ($p < 0.001$), as well as between Transparent and Deceptive morphological conditions, TF and DF, ($p <$

0.001). There is no statistical difference, however, between the Neutral and Deceptive feminine morphological conditions, NF and DF, ($p = 0.69$). We find in the feminine conditions, the same pattern for the L1 English speakers as with the L1 Spanish speakers, with no statistical difference between the feminine Neutral and Deceptive conditions; the difference is that L1 Spanish speakers' target gender accuracy rates remain above chance, whereas L1 English speakers preform quite poorly in assigning feminine gender in these two conditions.

Also noteworthy is that if we look to Table 6.7, the Target and Misassigned results from the three conditions at the top (TM, TF, and NM) are roughly the inverse results from the three conditions at the bottom (NF, DM, DF). That is to say, when the nonce noun ends in *-o*, L1 English speakers asssign masculine gender to it in roughly the same numbers, regardless of the syntactic cues present (56 Target (77.8%) for the TM condition and 52 Misassigned (72.2%) for DF). A pairwise t-test comparing TM target responses with DF non-target responses reveals no statistical significance ($p = 0.778$). Likewise, for nonce nouns ending in *-a*, the results of a pairwise t-test comparing TF target responses and DM non-target responses reveal no statistical significance ($p = 0.570$). In the neutral morphology cases, participants assigned Target masculine gender (NM) in 53 of 72 instances (73.6%) and misassigned masculine gender (NF) in 47 of 72 instances (65.3%). The results from a pairwise t-test comparing NM target and NF non-target responses yields a statistically significant result at the 95% confidence level ($p = 0.048$). This all suggests that when a novel noun ends in a canonical gender vowel (*-o* or *-a*), L1 English speakers are most likely to assign gender that is consistent with the canonical corresponding gender. When a noun ends in *-e*, speakers are more likely to assign masculine gender than feminine gender, but speakers are slightly more inclined to take advantage of the syntactic cues to assign gender in the Neutral Feminine condition as compared with the Deceptive Feminine condition.

6.2 Analysis of Production Responses

The data from the first task allow us to address the first three Research Questions and Hypotheses presented in section 5.1 of the previous chapter, repeated here for convenience and considered one by one.

> **Research Question 1:** Do L1 Brazilian Portuguese (BP) / L2 Spanish speakers assign grammatical gender to new nouns like L1 Spanish speakers do?
>
> **Hypothesis 1:** L1 BP / L2 Spanish speakers assign gender in their L2 like L1 Spanish speakers. Seeing as the feature structure hierarchy for Spanish and Portuguese is identical when it comes to gender and constraints on gender agreement relations are the same in both languages, L1 BP speakers employ their L1 constraints when assigning gender to a novel noun in their L2, using gender information from determiners and modifiers to assign target gender.

Hypothesis 1 is partially confirmed by the results from the production task. It is clear that L1 BP speakers rely heavily on the syntactic information provided in the determiners and modifiers to assign gender to a novel noun. Additionally, like L1 Spanish speakers, their accuracy rates in the Transparent and masculine Neutral morphological conditions are quite high. However, L1 BP speakers depend more heavily on morphological cues than L1 Spanish speakers. This is evident in the difference in results between the L1 Spanish and L1 BP speakers when it comes to the Neutral and Deceptive Feminine conditions. The L1 Spanish speakers show the lowest accuracy rates in these two conditions, but there is no difference between the two conditions. L1 BP speakers also show the lowest accuracy rates in these

two conditions; however, accuracy rates for the Deceptive Feminine condition are considerably lower than those for the Neutral Feminine condition.

> **Research Question 2:** Are L1 English / L2 Spanish speakers able to derive gender information from syntactic agreement relations (i.e., the determiner and modifier) to assign gender to novel nouns?
>
> **Hypothesis 2:** L1 English / L2 Spanish speakers are able to use gender information from syntactic agreement relations to assign gender to novel nouns; however, phonological form is predicted to be a stronger cue for L1 English speakers because gender is only a feature of nouns and pronouns in English. Therefore, they will more often use the gender cues of the noun itself, rather than employ information from the determiners and modifiers.

Hypothesis 2 is confirmed by the production task data. The data suggest that L1 English / L2 Spanish assign gender largely based on the morphophonological shape of the word; however, there is evidence that they are able to assign novel noun gender based on the information provided on the determiners and modifiers to the novel noun in 12.5% of Deceptive Feminine cases and 15.3% of Neutral Feminine cases, in both of which the syntactic cues are the only available cues to accurately assign target gender.

There is an additional element to be considered in the results of the L1 English speaker group (that is present in the L1 BP and L1 Spanish results as well), which is that assigning feminine gender is demonstrably more costly. This is likely due to the masculine gender's unmarked status in Spanish. In this case it could be said that there are, in fact, three strategies that speakers can rely on to establish the gender of a novel noun: syntactic; morphological/phonological; and unmarkedness. The results from the production task suggest that perhaps L1 English speakers rely most heavily on morphophonological cues, for which, when present, L1 English

speakers are most likely to assign gender consistent with the canonical gender ending (32 morphologically consistent gender responses in the DM condition, compared with 25 target gender responses). The next most productive strategy for L1 English speakers is the unmarkedness strategy, which is evidenced in the Neutral morphology responses (53 target responses for the masculine neutral condition as compared to 47 misassigned responses for the feminine neutral condition). The least productive gender assignment strategy for L1 English speakers uses syntactic cues. The production task data suggest that L1 English speakers (at the high-intermediate level) are able to incorporate syntactic information, as evidenced by target gender response answers in the feminine Neutral and Deceptive conditions; however, unmarkedness and morphophonological form generally take precedence in assigning gender.

Research Question 3: Does a learner's L1 have an effect on the types of errors they make?

Hypothesis 3a: L2 speakers can perform target gender agreement operations, regardless of L1. Although errors on gender agreement are predicted to be largely errors of lexical assignment, rather than syntactically malformed phrases for all speakers; a learner's L1 will have an effect on the types of errors produced. When L1 BP speakers produce non-target phrases, they are predicted to only produce errors of assignment; whereas L1 English speakers are predicted to make a small but significant number of errors in the syntactic constraints on gender agreement.

Hypothesis 3b: When errors are the result of a break down in the syntactic structure, they are predicted to occur in cases of the greatest complexity, where morphological and syntactic features collide and point to different gender conclusions; and, in the case of L1 English speakers, these breakdowns are predicted to occur at points where the nominal

agreement hierarchy most differs from their L1 hierarchy (i.e., in adjectival agreement).

The results from the production task mostly confirm Hypothesis 3a. Errors made by participants in both L2 groups are largely errors of gender assignment, rather than ungrammatical errors. Nevertheless, L1 Spanish and BP speakers did produce noun phrases that violated syntactic gender constraints, contrary to initial predictions; though they did so at considerably lower rates than L1 English speakers. L1 Spanish speakers violated syntactic constraints in only three of 432 responses (0.7%) and L1 BP speakers showed violations in syntactic constraints in 11 of 432 responses (2.5%). L1 English speakers, on the other hand, violated Spanish syntactic constraints in 57 of 432 responses (13.2%), considerably higher than those made by L1 Spanish and BP speakers, yet small in comparison to the number of responses attributed to misassignment: 157 of 432 (36.3%).

Hypothesis 3b appears to be only partially confirmed, although we must redefine cases of complexity. Both L1 English and L1 BP speakers have the fewest number of ungrammatical errors in the masculine Transparent and Neutral morphological conditions (6 for each condition among the L1 English speakers, and only one error for the masculine Neutral condition among the L1 BP speakers). Errors among the other conditions were higher; however, if we include markedness as a cue for gender assignment (with [-fem] as the default value), then all feminine conditions in the study consist of at least one feature clash ([+fem]) and the masculine Transparent and Neutral conditions are the two that contain no feature clashes.

The aspect of Hypothesis 3b that is not supported by the evidence is that English speakers would commit more errors where the nominal agreement hierarchy most differs from their L1 hierarchy (i.e., adjectival agreement). Overall, L1 English participants committed far more errors with the determiner than with the adjective

(18 adjectival errors compared with 39 determiner errors). Within each condition, Transparent Masculine is the only condition in which there were more adjectival errors than errors on determiners. One possible explanation could be that the adjectives in the short stories were highly salient, so participants are repeating them exactly as they hear them, and therefore accuracy with the adjective is better than with determiners.

6.3 Retention Results

The results from the retention task are presented here in this section. To begin, a general overview of the results are compiled in Table 6.8 based on whether the participants responded to the prompts in the retention task using grammatical gender forms that are consistent with the grammatical gender forms they used in the production task. At first blush, the results in Table 6.8 seem to indicate that L1 English speakers, contrary to the initial hypotheses, have overall higher retention rates than L1 BP and L1 Spanish speakers.

	L1 Spanish	L1 BP	L1 English
TM	48	56	57
TF	37	49	49
NM	45	56	49
NF	15	29	48
DM	13	30	46
DF	10	33	56

Table 6.8: Target Retention Rates by Participant Group

Upon further analysis, however, it seems likely that these results have more to do with the way that L1 English speakers initially assign gender in the production task than an increased ability to retain gender. Recall that in section 5.3.2 of the previous

chapter, the coding for this task is outlined and is based in the individual responses for each participant for each item. That is to say, if the participant responds with a non-target response in the production task and then responds with that same gender, though it is non-target in the original response, it is considered that the gender is retained. The following sections examine the results from the retention experiment in detail, analyzing the responses in each participant group beginning with the L1 Spanish group, followed by the L1 BP group and concluding with the L1 English group.

6.3.1 L1 Spanish Retention Results

The results from the L1 Spanish speaker group are presented in Table 6.9 below and are categorized based on whether the participants produced gender in the retention task that was consistent (S) or divergent (D) from the gender that the participant originally assigned the noun in the production task and whether that initial gender assignment was Target (T), Misassigned (M), or Ungrammatical (U). Additionally, some participants avoided using gender in the retention task, those results are presented as well, coded as Avoidance (A).[2]

	Retained Gender			**Divergent Gender**			**Avoidance**		
	ST	**SM**	**SU**	**DT**	**DM**	**DU**	**AT**	**AM**	**AU**
TM	48	0	0	0	1	0	20	0	0
TF	37	0	0	4	1	0	26	1	0
NM	45	0	0	1	1	0	21	1	0
NF	7	8	0	32	1	0	12	9	0
DM	7	6	0	35	0	0	18	3	1
DF	2	8	0	30	2	1	18	8	1

Table 6.9: Spanish Retention Results

The information from Table 6.9 is condensed into Retained and Divergent responses (Avoidance responses are, for the moment, disregarded) in the retention

[2]See Chapter 5.3.2 for further information on the coding for the retention task.

task and presented visually in Figure 6.5. Like the results from the production task, the Transparent Morphology and masculine Neutral Morphology conditions turn out to be less problematic in the retention results.

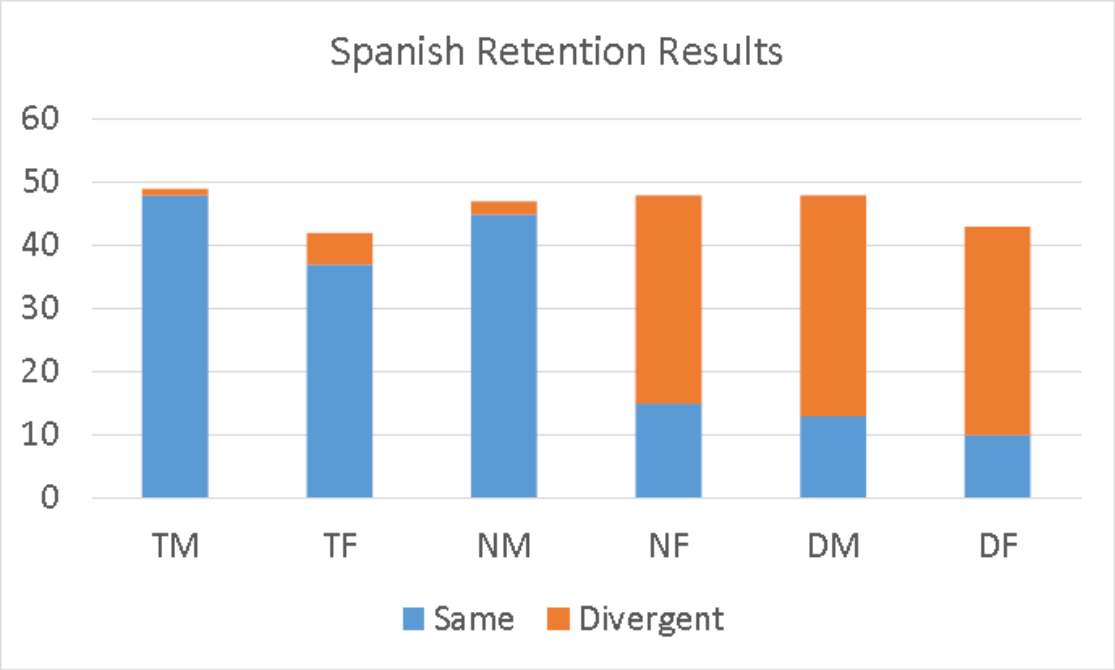

Figure 6.5: L1 Spanish Nonce Gender Retention Responses

There are few divergent gender responses for the Transparent conditions (TM & TF) and the Neutral Masculine (NM) condition; however, in the Neutral Feminine (NF) and the Deceptive morphophonological (DM & DF) conditions, the majority of participant responses diverge from the gender they initially assigned in the production and interpretation portion of the experiment. In fact, it can be seen in Table 6.9 that only 7 responses, of an original 52 (13.5%) target gender responses, retained target gender in the Neutral Feminine (NF) condition. In the Deceptive Masculine (DM) condition, there were 7 responses, of an original 62 target responses (11.3%), that retained target gender and in the Deceptive Feminine (DF) condition only 2 responses of an original 51 target responses (3.9%) retained target gender in the retention task.

These results indicate that two presentations of six novel nouns is insufficient exposure for L1 Spanish speakers to retain the grammatical gender of each new noun. As grammatical gender has not been retained for the majority of nouns presented, L1 Spanish speakers default to other gender assignment strategies: morphophonology, when it is informative, and [-fem] when it is not.

6.3.2 L1 BP Retention Results

A breakdown of the results from the L1 BP speakers, presented in Table 6.10, shows a similar trend to the L1 Spanish retention results in that for the Transparent (TM & TF) and Neutral Masculine (NM) conditions the L1 BP group performs very well on the retention task; however, gender retention rates drop significantly in the Deceptive (DM & DF) and Neutral Feminine (NF) conditions. Rates of avoidance are much lower among the L1 BP group, averaging around 15% of responses in the retention task as compared to the L1 Spanish group that avoided gender use in approximately one-third (33.4%) of all retention items.

	Retained Gender			**Divergent Gender**			**Avoidance**		
	ST	**SM**	**SU**	**DT**	**DM**	**DU**	**AT**	**AM**	**AU**
TM	56	0	0	2	0	0	10	0	0
TF	48	0	1	3	4	2	10	0	0
NM	54	2	0	1	0	0	8	1	0
NF	11	18	0	28	2	1	5	5	0
DM	12	18	0	25	1	2	9	4	0
DF	6	27	0	17	1	3	4	12	0

Table 6.10: L1 BP Retention Results

Contrary to the original predictions, which asserted that L1 Spanish and L1 BP speakers would retain gender from the production task at equal rates, results indicate that L1 BP speakers are, in fact, performing better on the retention task than the L1 Spanish speakers. However, it must also be noted that L1 Spanish

speakers avoided using gender agreement at a much higher rate than L1 BP speakers, which could account for some of the difference in results between the two groups.

The condensed results are presented visually in 6.6. The retention rates among L1 BP speakers are noticeably higher than those of their L1 Spanish counterparts. However, upon closer inspection one can see that L1 BP speakers relied on morphophonological cues more than L1 Spanish participants did in the initial production task.

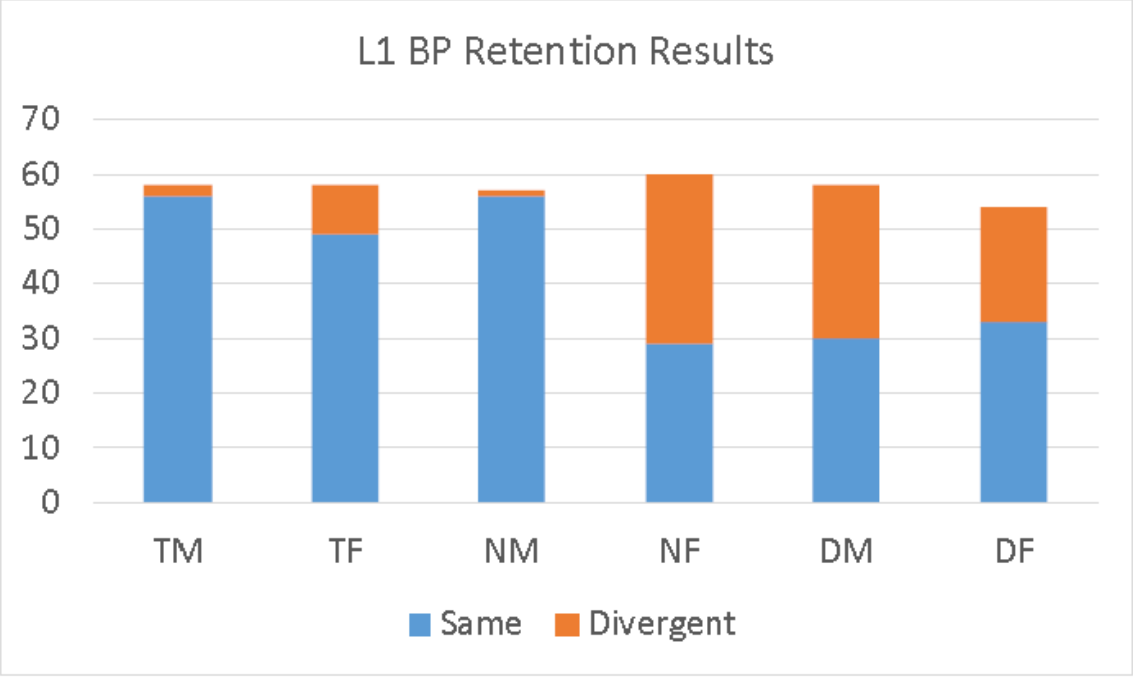

Figure 6.6: L1 BP Nonce Gender Retention Responses

L1 BP participants correctly attribute feminine gender to Neutral Feminine (NF) conditions in 44 of 72 experimental items (61.1%) in the production task; of these items, participants retained target gender on 11 items (25%). In the Deceptive Masculine (DM) condition, participants retained 12 of 46 (26.1%) original target responses and in the Deceptive Feminine (DF) condition, where L1 BP participants were least accurate overall in the production task, speakers provided 6 descriptions in

which the gender was consistent with the original 27 target gender responses of the production task (22.2%).

Although L1 BP speakers are more likely than L1 Spanish speakers to assign non-target gender in the production task, they are nonetheless more accurate at the retention task in the retained target gender in every condition. Again, it must be noted that L1 Spanish speakers avoided using grammatical gender in the retention task at much higher rates than L1 BP speakers. This result may simply be an indication that L1 speakers are more adept at using avoidance strategies when they are unsure about the grammatical gender of an item. Further discussion about grammatical conservatism is addressed in section 7.4 of the next chapter.

6.3.3 L1 English Retention Results

The L1 English speaker group retention results are presented in Table 6.11 below. In contrast to the L1 Spanish and L1 BP speaker groups, there are relatively few instances of gender avoidance among L1 English participants: only 18 of 411 responses (4.4%).

	Retained Gender			**Divergent Gender**			**Avoidance**		
	ST	**SM**	**SU**	**DT**	**DM**	**DU**	**AT**	**AM**	**AU**
TM	53	0	4	1	5	2	3	0	0
TF	36	7	6	5	5	7	2	0	2
NM	45	2	2	5	6	4	3	0	0
NF	2	41	5	9	5	5	0	1	1
DM	10	26	10	15	4	0	0	2	1
DF	4	47	5	5	1	4	0	3	0

Table 6.11: L1 English Retention Results

These results are condensed into Retained and Divergent responses and presented visually below in Figure 6.7. The L1 English speaker results appear to show a different trend than the L1 Spanish and L1 BP speaker groups' results. While both

L1 Spanish and L1 BP speakers perform well on the retention of gender in the Transparent (TM & TF) and Neutral Masculine (NM) conditions and significantly less well on the Neutral Feminine (NF) and Deceptive morphophonological (DM & DF) conditions, the L1 English speakers consistently use the same gender in the production and retention tasks at high rates, regardless of condition.

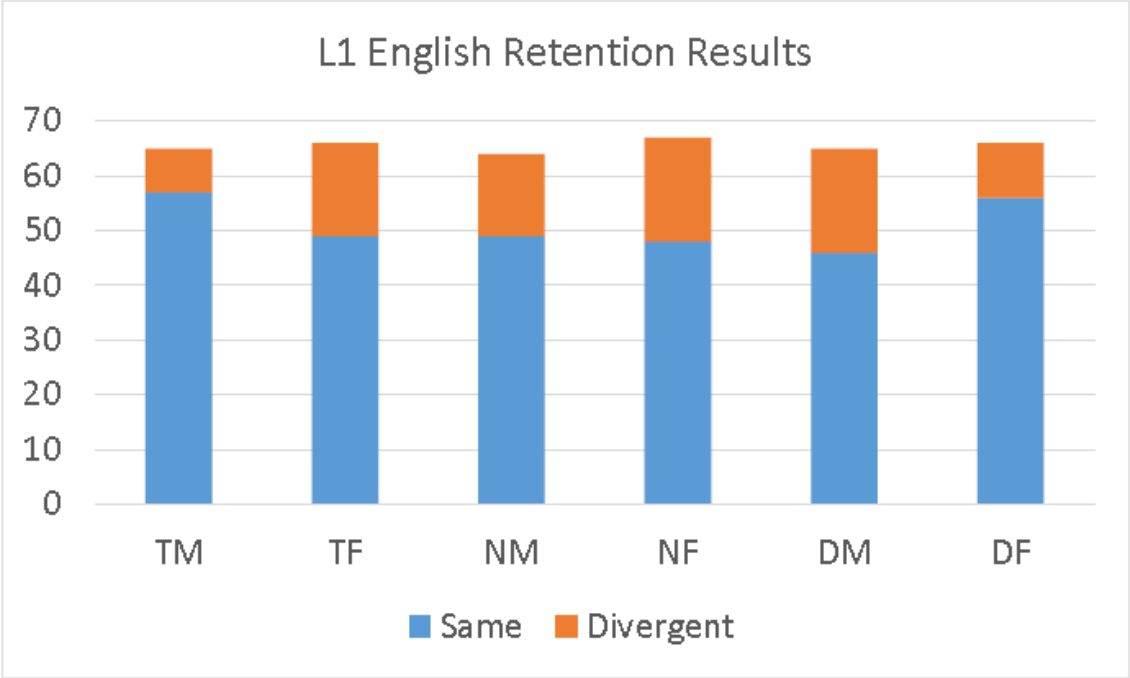

Figure 6.7: L1 English Nonce Gender Retention Responses

Upon closer inspection of the data, it can be seen that L1 Spanish speakers and L1 BP speakers are more likely to produce the proper target gender in the production portion of the experiment, while English speakers assign gender largely based on morphophonology, when informative, and on the unmarked masculine when morphophonology is not informative.

If we investigate the number of retained responses within the target gender answers from the production task, we see that for the Neutral Feminine (NF) condition 2 responses of an original 11 target responses (18.2%) were retained. For the Deceptive Masculine (DM) condition, English speaking participants retained 10 of an original 29

target responses (34.5%) and in the Deceptive Feminine (DF) condition, participants retained 4 of 9 target gender cases (44.4%).

6.3.4 Analysis of Retention Results

The results from the retention study allow us to address the fourth Research Question and its related Hypothesis, originally presented in Section 5.1 of the previous chapter and repeated here for convenience.

> **Research Question 4:** Does the presence of the gender feature in a speaker's L1 facilitate their retention of novel noun gender in their L2?
>
> **Hypothesis 4:** Once Spanish and Portuguese speakers have specified a noun for gender, they will be able to maintain that gender when asked to describe the item a few minutes after its initial presentation. Since their L1 requires that all nouns are specified for gender, they are accustomed to retaining gender information of new words they learn. English speakers, on the other hand, do not mark nouns in their L1 for gender and, therefore, they are predicted to be less accurate in gender retention.

Hypothesis 4 is not confirmed by the results of the retention task in this study. Neither L1 Spanish speakers nor L1 BP speakers are at an advantage when it comes to retention. This is likely due to the complexity and size of the task; exposure to a novel word twice in a story is not sufficient to retain the grammatical gender of the item after a few minutes have passed (when participants are required to complete additional tasks in the interim period of time). It is possible that more robust exposure to the novel nouns would yield significant gender retention results for speakers whose L1 has grammatical gender; however, further studies must be conducted to find if this is indeed the case.

In all three participant groups there are few cases of target gender retained for novel nouns in the Neutral Feminine (NF) condition and both Deceptive (DM & DF) conditions. The number of retained target gender cases was low across all groups in these conditions (16 retained target cases in the NF, DM, and DF conditions for L1 Spanish; 29 retained target cases in these same conditions for L1 BP; and 16 retained target answers in these conditions for L1 English). It is also important to point out that L1 Spanish speakers display high rates of gender avoidance, which is likely to account for their resulting poorer performance when compared to the two L2 Spanish groups. What is clear, however, across all participant groups is that for the retention task, the gender provided was more likely to follow canonical morphology (in TM, TF, DM, and DF conditions) or fall to the unmarked masculine (in NM and NF conditions) regardless of L1. In the given task, six novel items presented twice each in six short story situations appears to be insufficient exposure for assigning and retaining gender of a nonce noun.

6.4 SPR Results

The final experiment conducted in this study is a Self-paced Reading (SPR) experiment, as explained in Chapter 5.2.3, which examines processing speeds via participant reading times of each segment of the experimental items. Participants read sentences with a novel noun antecedent that is later recovered by a null nominal (e.g., *la roja* 'the red (one)'). The goal of this study is to investigate how native and non-native Spanish speakers assign gender and recover antecedents with the gender cues of the null nominal.

The formula for the experimental SPR items, presented in (79) in the previous chapter, is repeated in (88) for convenience. The analysis focuses on the reading times

(in ms) of four segments, presented in bold in (88), those being: the Nonce segment, the spillover of the Nonce segment (Verb2), the Null Nominal segment, and the Null Nominal Spillover segment (spill-over). The possible conditions, described in the previous chapter in Table 5.2, are reproduced below in Table 6.12 for convenience.

(88) NP | verb1 | **Nonce** | **Verb2** | **Null Nominal** | **Spill-over** | wrap-up

TM:	Miguel	quiere	un fireno,	prefiere	el rojo	que está	en la mesa.
TF:			una firena,		la roja		
NM:			un firene,		el rojo		
NF:			una firene,		la roja		
DM:			un firena,		el rojo		
DF:			una fireno,		la roja		

Table 6.12: Self-Paced Reading Sample Conditions

Average reading times (in ms) for the target segments are presented for all three groups in each condition in Table 6.13. As to be expected, average reading times are faster for the native speaker group than for the two L2 speaker groups. It should also be noted that reading times for the Nonce segment are quite long for all groups and in all conditions.

A Two-Way ANOVA by subjects, crossing the factor group of L1 (Spanish, BP, English) with condition (TM, TF, NM, NF, DM, DF) yeilds a Significant Main effect for Condition in the Nonce segment ($F(5,345) = 2.386$, $p = 0.0379$) as well as for the second Verb segment, which is the spillover to the Nonce Segment ($F(5,345) = 3.110$, $p = 0.00924$). A significant Main effect is also found for participants' L1 in the Verb2 Segment ($F(2,69) = 5.162$, $p = 0.00815$), the Null Nominal Segment ($F(2,69) = 7.616$, $p = 0.00103$), and for the Spill-over of the Null Nominal Segment ($F(2,69) = 4.987$, $p = 0.00948$). Additionally, a significant main effect for interaction of L1 and Condition is found in the Verb2 Segment ($F(10,345) = 2.229$, $p = 0.01588$). These results are summarized in Table

Condition	L1	Nonce	Verb2	Null Nominal	Spill-over
TM					
	Span	1214.3	709.8	686.9	746.2
	BP	1397.2	978.0	1021.7	878.7
	Eng	1450.4	839.0	1135.1	873.0
TF					
	Span	1347.2	687.8	677.0	642.6
	BP	1655.0	1119.0	1097.2	947.1
	Eng	1625.8	978.6	1091.6	887.7
NM					
	Span	1326.4	733.4	668.4	668.5
	BP	1535.5	870.4	1039.1	971.7
	Eng	1451.1	839.0	946.1	863.4
NF					
	Span	1433.6	733.4	799.9	787.2
	BP	1641.8	1051.8	1047.6	989.9
	Eng	1621.7	1005.8	1207.1	927.2
DM					
	Span	1277.2	767.8	747.3	791.6
	BP	1402.0	928.5	1031.0	947.8
	Eng	1583.7	889.5	964.7	916.6
DF					
	Span	1316.0	751.2	752.1	795.4
	BP	1633.9	836.2	958.8	858.7
	Eng	1523.5	959.0	1003.3	1069.9

Table 6.13: SPR Average Reading Time (ms) Results

	Nonce		Verb2		Null Nom		Spill-over	
	F-val	Pr(<F)	F-val	Pr(<F)	F-val	Pr(<F)	F-val	Pr(<F)
Con	2.386	**0.038**	2.229	**0.016**	1.764	0.120	1.207	0.305
L1	0.920	0.404	5.162	**0.008**	7.616	**0.001**	4.987	0.009
Con:L1	0.294	0.982	3.110	**0.009**	0.833	0.597	1.414	0.172

Table 6.14: ANOVA results for critical segments

In the following sections, results by participant group are presented in the order of L1 Spanish group, the L1 BP group, and finally the L1 English group. The SPR results are concluded with a general overview of results across all participant groups along with a brief analysis of the results as they relate to the study's fifth research question and hypothesis.

6.4.1 L1 Spanish SPR Results

In the L1 Spanish group, a one-way ANOVA by condition finds a significant main effect in the Spill-over segment ($F(5,391) = 2.281$, $p = 0.046$). Reading time results by morphophonological condition are presented in Figure 6.8 (Transparent), Figure 6.9 (Neutral), and Figure 6.10 (Deceptive). A series of T-tests comparing Masculine and Feminine gender within each morphophonological condition yields no significant results for the Transparent or Deceptive conditions; however, there is a significant effect in the Spill-over segment in the Neutral conditions ($p = 0.03242$) as well a p-value nearing significance in the Null Nominal segment ($p = 0.05597$).

Another battery of t-tests comparing morphophonological conditions to each other, there is a significant result for the Spill-over segment ($p = 0.01209$) in the Transparent Conditions as compared to the Deceptive Conditions as well as a p-value nearing significance in the Null Nominal segment ($p = 0.07587$) and in the Verb2 segment ($p = 0.07171$). This is to say, significant processing lags are found in the Neutral Feminine (NF) and the Deceptive (DM & DF) conditions in comparison with the Neutral Masculine (NM) and Transparent (TM & TF) conditions. Note that these results parallel those from the production task, where L1 Spanish speakers encountered the lowest rates of target gender accuracy in these same conditions.

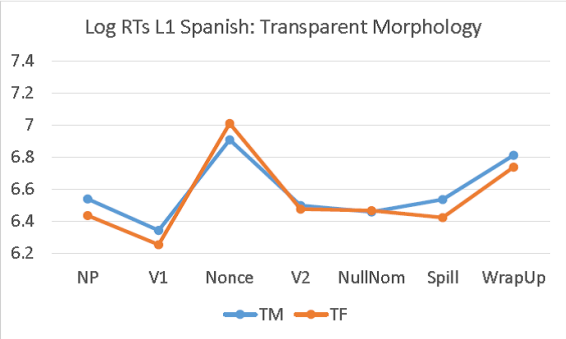

Figure 6.8: Transparent Conditions

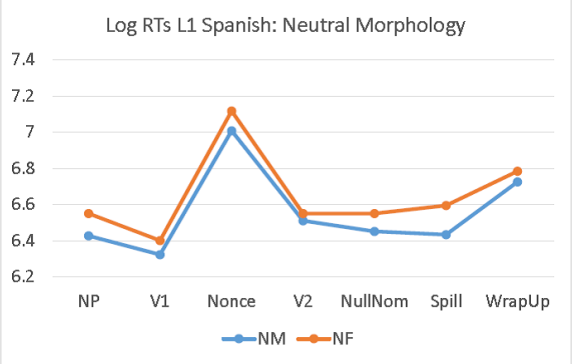

Figure 6.9: Neutral Conditions

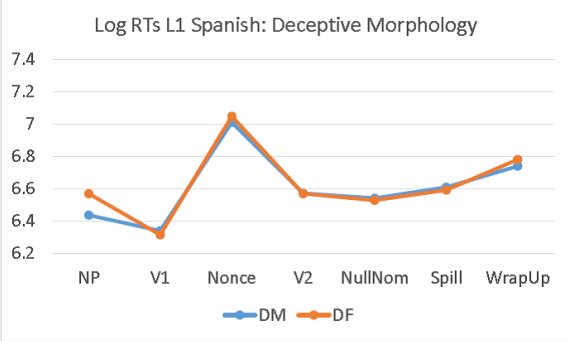

Figure 6.10: Deceptive Conditions

6.4.2 L1 BP SPR Results

For the L1 BP group, a one-way ANOVA by condition reveals no significant main effects in any of the focus segments. Mean log Reading Times for masculine and feminine gender are represented by morphophonological condition in Figure 6.11 (Transparent), Figure 6.12 (Neutral), and Figure 6.13 (Deceptive).

A series of t-tests finds no significant results for the Transparent or the Deceptive Conditions; however, in the Neutral Conditions, there is a significant result between the masculine and feminine conditions in the Verb2 segment ($p = 0.01154$), which is the spill-over from the Nonce segment. Comparing morphophonological conditions against one another finds a statistically significant result between Transparent and Deceptive conditions in the Verb2 segment ($p = 0.01275$). There are no signif-

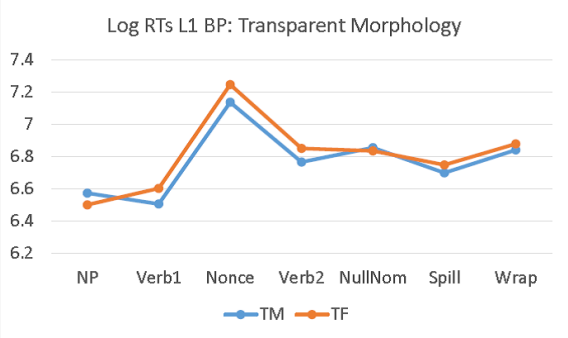

Figure 6.11: Transparent Conditions

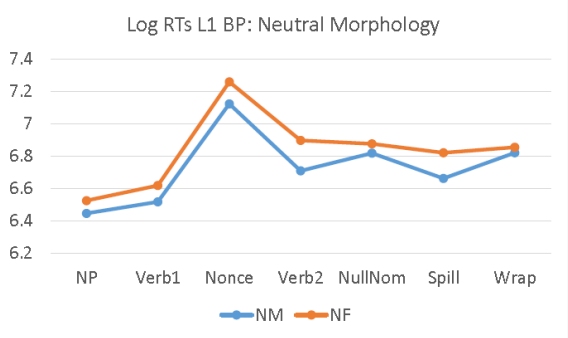

Figure 6.12: Neutral Conditions

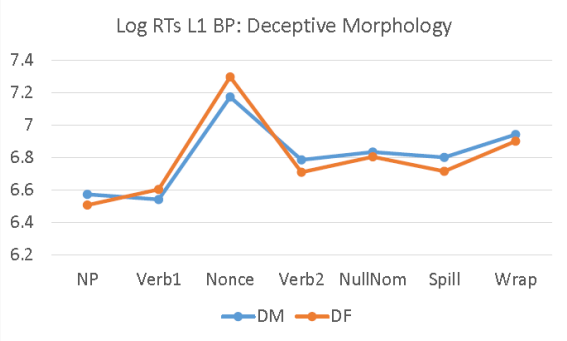

Figure 6.13: Deceptive Conditions

icant results between Transparent and Neutral conditions, nor are there significant results between Neutral and Deceptive conditions.

The results from the L1 BP speakers are also reminiscent of the production task results in that processing lags are found in the same conditions that posed greater inaccuracy rates for target gender assignment (NF, DM, DF). These are also the same conditions that produced processing lags in L1 Spanish speakers; however, unlike the L1 Spanish speakers, the processing lags appear earlier in the sentence (in the V2 segment, as opposed to the Null Nominal spillover segment for the L1 Spanish speakers).

6.4.3 L1 English SPR Results

A one-way ANOVA by condition within the L1 English group reveals no significant main effects for any of the focus segments (Nonce: $F(5,369) = 0.31$, $p = 0.907$; Verb2: $F(5,369) = 0.564$, $p = 0.728$; Null Nominal: $F(5,369) = 0.057$, $p = 0.998$; Spill-over: $F(5,369) = 1.03$, $p = 0.4$). The log Reading Times for the L1 English group are represented by morphophonological condition in Figure 6.14 (Transparent), Figure 6.15 (Neutral), and Figure 6.16 (Deceptive).

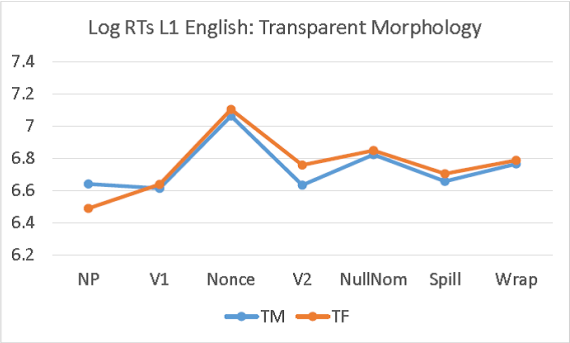

Figure 6.14: Transparent Conditions

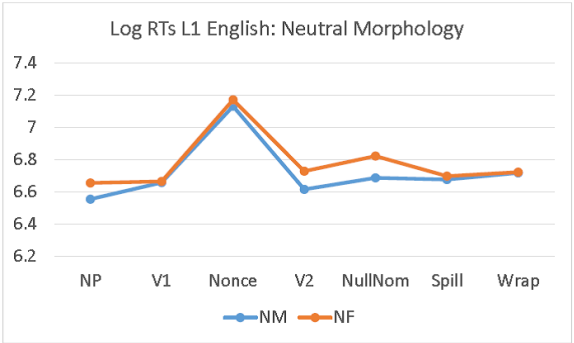

Figure 6.15: Neutral Conditions

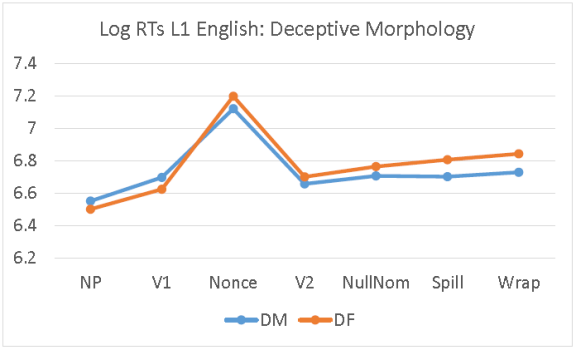

Figure 6.16: Deceptive Conditions

An array of t-test comparing masculine and feminine conditions within each morphophonological condition yields no significant results in any of the focus segments. Additionally, no significant results come from a series of t-tests comparing morphophonological conditions to each other in any of the focus segments.

Although mean average Reading Times tend to lag in the feminine conditions, which can be seen in Figures 6.14, 6.15, and 6.16 above, these differences are not significant. There are two possible explanations for the lack of significant results among the L1 English speaker group: it could simply be that L1 English speakers do not make use of grammatical gender in processing; conversely, a more robust L1 English speaker population might yield statistically significant results in some of the conditions where we now only see trends in longer reading times.

6.5 Analysis of SPR Results

The results reported in the previous section serve to better understand processing of grammatical gender by L1 and L2 speakers. Here the last of this study's five Research Questions is addressed along with the corresponding Hypothesis presented in Section 5.1, repeated here for convenience.

> **Research Question 5:** Does a speaker's L1 affect how they process anaphoric agreement with nonce nouns?
>
> **Hypothesis 5:** Spanish and Portuguese speakers employ structure sharing between the determiner and the nonce noun; therefore, we expect to see no differences in reading times for the anaphoric null nominal. English speakers, on the other hand, use morphophonological strategies to assign gender to the novel noun; thus we expect to see a surprise effect around the anaphoric null nominal segment when the grammatical gender of the noun is not congruent with the morphophonological form (e.g., *la fulipo*).

Further research is needed to properly investigate this Hypothesis. The results from the SPR study do not confirm the prediction that L1 English speakers would experience a surprise effect from the anaphoric null nominal segment. One possibility is

that high-intermediate level L1 English speakers simply do not process gender at all when reading in Spanish. In fact, Phillips et al. (2011, p. 172) suggest that "person, gender, and number features of reflexives like *himself*, *herself*, and *themselves* play no role in the search for antecedents" as if they were feature-neutral reflexives like German *sich*. In their analysis, Phillips et al. assert that antecedents are retrieved using only structural cues. The structure of the experimental phrases used in the SPR task, though they do not use reflexive pronouns, makes it possible to retrieve the proper antecedent without person, gender, and number features. Take into consideration, the English translation of one of the experimental items, provided in example (89). It would be infelicitous for '*the red one*' to refer to anything other than '*a fireno*'; in this case, the context and the structure of the phrase is enough to resolve the antecedent.

(89) Michael wants a fireno$_i$, he prefers the red one$_i$ that's on the table.

L1 Spanish speakers showed reading time lags in the Neutral Feminine (NF) condition starting at the Null Nominal segment, contrary to the predictions of Hypothesis 5, as did L1 BP speakers starting from the Nonce segment. Significant results were also found comparing Transparent and Deceptive morphophonological conditions in both L1 Spanish and L1 BP speaker groups. These results suggest that for these groups, there is a processing cost to deceptive morphophonology, as the conflicting gender assignment cues require additional attention, while congruent cues facilitate processing. Also for both these groups there was a significant effect found between the masculine and feminine Neutral morphophonological conditions. For L1 Spanish speakers, this effect is found in the Spill-over segment following the Null Nominal; in the L1 BP speakers, this effect was found in the Verb2 segment that follows the Nonce noun segment. It seems that without morphophonology to facilitate (or hinder) gender assignment, we are able to see the cost of assigning feminine gender to a new noun.

For L1 English speakers there were no significant effects for gender in any of the morphophonological conditions in any of the focus segments. However, looking at the mean log Reading Times in Figures 6.14, 6.15, and 6.16, it seems that there is a trend for reading times on feminine conditions to lag in comparison to the masculine conditions. Further investigation is needed in order to better understand if this trend is indeed significant.

It is highly plausible that the reading time lag in the Nonce segment of all conditions and all participant groups, which exists by virtue of it being an unfamiliar word, eclipses effects that might otherwise be present due to the experimental manipulations. A non-reading dependent task could mitigate this effect and reveal more information about how L1 and L2 Spanish speakers process gender on new nouns. Even so, the results indicate that there is a processing cost to implementing grammatical gender relations on novel nouns that have conflicting gender assignment cues for speakers that have gender in their L1. Further investigation is needed to make conclusions about L1 English processing of grammatical gender in their L2. Perhaps a more robust sample size would yield more significant results for all three participant groups.

CHAPTER 7

DISCUSSION AND CONCLUSIONS

The work presented here in this dissertation serves to further investigate Lardiere's proposal (2008; 2009b; 2009a) for feature (re-)assembly as a theory of SLA, using a constraint-based theory as proposed by Carroll (2009). This feature (re-)assembly proposal is incorporated into the Multiple Grammars theory proposed by Roeper (1999) and extended to SLA by Amaral and Roeper (2014). The results from the experimental tasks in this dissertation provide data that illuminate issues related to feature reassembly and MG theory, such as the existence of conflicting rules (or rather, *contraints*), feature values, productivity, optionality, and production-comprehension asymmetries. In this chapter, the results of the data are discussed with relevance to these issues along with suggestions for future directions for this work.

7.1 Feature Selection and Reassembly in SLA

7.1.1 Noun Gender Values in Spanish

The evidence gathered in this study, as well as numerous studies on first and second language acquisition (Hernández-Pina, 1984; Pérez-Pereira, 1991; López-Ornat, 1997; Fernández-García, 1999; Bruhn de Garavito and White, 2002; White et al., 2004; Montrul et al., 2008; Alarcón, 2009; among others) is sufficient to effectively argue that in Spanish there is not a *masculine / feminine* distinction for nouns, but rather a [±fem] feature and, furthermore, that the assignment of [+ fem] comes at a cognitive cost.

In the production experiment, L1 Spanish speakers were most likely to misassign gender in the Neutral Feminine (NF) and Deceptive Feminine (DF) morphophonological conditions (and equally likely to misassign gender in each condition). These results indicate that overt morphophonological cues facilitate proper gender assignment for L1 Spanish speakers. When these cues are not present, there is a cost to assigning the [+fem] feature value; however, there is no additional cognitive cost to assigning [+fem] with a morphophonological cue that is canonically [-fem].

Let us refer back to the network of relationships proposed by Wechsler and Zlatic (2003) illustrated in example (33) in section 3.2.1 and reproduced here in example (90) for convenience.

(90) $\boxed{\text{morphology}} \Leftrightarrow \boxed{\text{CONCORD}} \Leftrightarrow \boxed{\text{INDEX}} \Leftrightarrow \boxed{\text{semantics}}$

The experimental tasks conducted in this study intentionally leave the issue of semantic gender to the wayside. We're left with *morphology*, CONCORD, and INDEX values that inform agreement relations. When the morphophonological shape of the word reinforces the CONCORD values, accuracy rates predictably increase. However,

the asymmetry between masculine and feminine in both the Neutral and Deceptive conditions indicate that the markedness of the feminine gender is an additional factor. This analysis is also supported by the results for the Deceptive Masculine (DM) condition, where L1 Spanish speakers produce target gender with higher accuracy than Deceptive Feminine (DF) and Neutral Feminine (NF) conditions.

$$\begin{bmatrix} \text{PHON} & \langle \textit{tapline} \rangle \\ \text{SYNSEM} & \begin{bmatrix} \text{LOCAL} & \begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{noun} \\ \text{CONCORD } \boxed{3} & \begin{bmatrix} \text{NUM} & \textit{sg} \\ \text{GEN} & \pm\textit{fem} \end{bmatrix} \end{bmatrix} \\ \text{SUBCAT} & \left\langle \begin{bmatrix} \text{SPR } \boxed{1} \left[\text{CONCORD } \boxed{3}\right] \\ \text{COMP } \langle\rangle \\ \text{MOD } \left\langle \left[\text{CONCORD } \boxed{3}\right] \right\rangle \end{bmatrix} \right\rangle \end{bmatrix} \\ \text{CONT} & \begin{bmatrix} \text{INDEX } i & \begin{bmatrix} \textit{ref} \\ \text{PERS} & \textit{3rd} \\ \text{NUM} & \textit{sg} \\ \text{GEN} & \pm\textit{fem} \end{bmatrix} \\ \text{RESTR} & \begin{bmatrix} \text{RELN} & \textit{'object'} \\ \text{INST} & i \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \\ \text{ARG-ST} & \langle \boxed{1} \rangle \end{bmatrix}$$

Figure 7.1: Lexical entry for nonce word '*tapline*'

In a Neutral condition word like *'tapline'* the CONCORD feature values on the determiner and the adjective inform the CONCORD values on the novel noun. However, assigning a [+ fem] gender feature is more costly than assigning default [- fem], or rather it should be said that assigning the value [- fem] does not require overt assignment, but assigning the [+ fem] feature value does. For native Spanish speakers, constraints like the Specifier Head Agreement Constraint (SHAC) (Sag et al., 2003, p. 107) and the Head-Modifier Rule (Sag et al., 2003, p. 502) ensure that the novel

noun receives the same CONCORD values via structure sharing. Nevertheless, this system is not immune to failings, as evidenced by the non-target results from the L1 speakers in the production task. These constraints inform the values in CONCORD for the novel noun in most cases (even in the Neutral and Deceptive morphophonological conditions, L1 Spanish participants assign target gender in 70% of trials), however, issues like markedness, morphophonological shape, and working memory can effect participants' ability to assign target gender to novel nouns.

$$\begin{bmatrix} \text{PHON} & \langle \textit{estudiante} \rangle \\ \text{SYNSEM} & \begin{bmatrix} \text{LOCAL} & \begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{noun} \\ \text{CONCORD } \boxed{3} \begin{bmatrix} \text{NUM} & \textit{sg} \\ \text{GEN} & \pm\textit{fem} \end{bmatrix} \end{bmatrix} \\ \text{SUBCAT} & \left\langle \begin{bmatrix} \text{SPR } \boxed{1} \left[\text{CONCORD } \boxed{3} \right] \\ \text{COMP } \langle\rangle \end{bmatrix} \right\rangle \end{bmatrix} \\ \text{CONT} & \begin{bmatrix} \text{INDEX } i & \begin{bmatrix} \textit{ref} \\ \text{PERS} & \textit{3rd} \\ \text{NUM} & \textit{sg} \\ \text{GEN} & \pm\textit{fem} \end{bmatrix} \\ \text{RESTR} & \begin{bmatrix} \text{RELN} & \textit{'estudiante'} \\ \text{INST} & i \end{bmatrix} \end{bmatrix} \end{bmatrix} \\ \text{ARG-ST} & \langle \boxed{1} \rangle \end{bmatrix} \end{bmatrix}$$

Figure 7.2: Lexical entry for '*estudiante*' (student)

The analysis of marked gender found in CONCORD is also apt for the gender value in the INDEX as the unmarked gender form is able to encompass female referents, however, the marked gender form cannot encompass male referents (Real Academia Española, 2010, p. 85), as illustrated by example (91) where 'hombre contemporáneo' (*contemporary man*) refers to a generic contemporary person, not necessarily a biologically male referent. In example (92), the speaker is looking specifically for a female

professor that speaks Russian; however, the sentence in (93) suggests that either a male or female professor that speaks French is acceptable.

(91) La película constituye una reflexión acerca del vacío existencial
The movie constitutes a reflection around about of.the emptiness
del hombre contemporáneo.
existential of.the man contemporary
The movie constitutes a reflection of the existential vacuum of the contemporary man.

(92) Buscamos una profesora que hable ruso.
We.search $a_{[+fem]}$ $professor_{[+fem]}$ that speaks Russian
We're looking for a female professor that speaks English.

(93) Buscamos un profesor que hable francés.
We.search $a_{[-fem]}$ $professor_{[-fem]}$ that speaks French
We're looking for a professor that speaks French.

With the results presented here, we adjust the feature value for Spanish to [±fem] as illustrated in the AVM diagram in Figure 7.2, as opposed to [masc ∨ fem], illustrated in Figure 3.7 in section 3.2.2.

To nip potential criticisms in the bud, we must also address the agreement system for determiners. The paradigm of articles, demonstratives, and pronouns in Spanish is generally construed as having three genders: masculine, feminine, and neuter (Real Academia Española, 2010).

(94) Masculine determiners & pronouns
   a. El - *The*
   b. Este - *This*
   c. Ese - *That*
   d. Aquel - *That over there*

(95) Feminine determiners & pronouns
   a. La - *The*
   b. Esta - *This*

c. Esa - *That*
d. Aquella - *That over there*

(96) Neutral determiners & pronouns
a. Lo - *The*
b. Esto - *This*
c. Eso - *That*
d. Aquello - *That over there*

This author argues, however, that the third 'neuter' gender is actually a separate feature apart from the [±fem] feature. This agreement form is not found as a feature of CONCORD, but rather is an INDEX feature of specificity that is only present on determiners, as illustrated in the INDEX of Figure 7.3.

(97) **El** mejor (vino) se produce en Rioja.
The$_{[-fem]}$ best$_{[-fem]}$ (wine) RFLX.PRON produce in Rioja
The best (wine) is produced in Rioja.

(98) **La** mejor (sidra) viene de Asturias.
The$_{[+fem]}$ best$_{[+fem]}$ (cider) comes from Asturias
The best (cider) comes from Asturias.

(99) **Lo** mejor está por venir.
The$_{[-spec]}$ best is for to.come
The best is yet to come.

The reasoning behind arguing that this specificity feature is not a feature of CONCORD is that this 'neuter' form never appears in contexts where CONCORD agreement is employed. It is only found in cases of referential agreement, such as pronominal reference or null nominal constructions, where the referent is something abstract and/or unspecific as in example (99).

Therefore, pronouns and determiners in Spanish have an additional feature in the INDEX, which we will call SPEC whose values are *spec* or *unspec*. When the value of this feature is *unspec*, the pronoun is inflected for unspecificity, which takes precedence

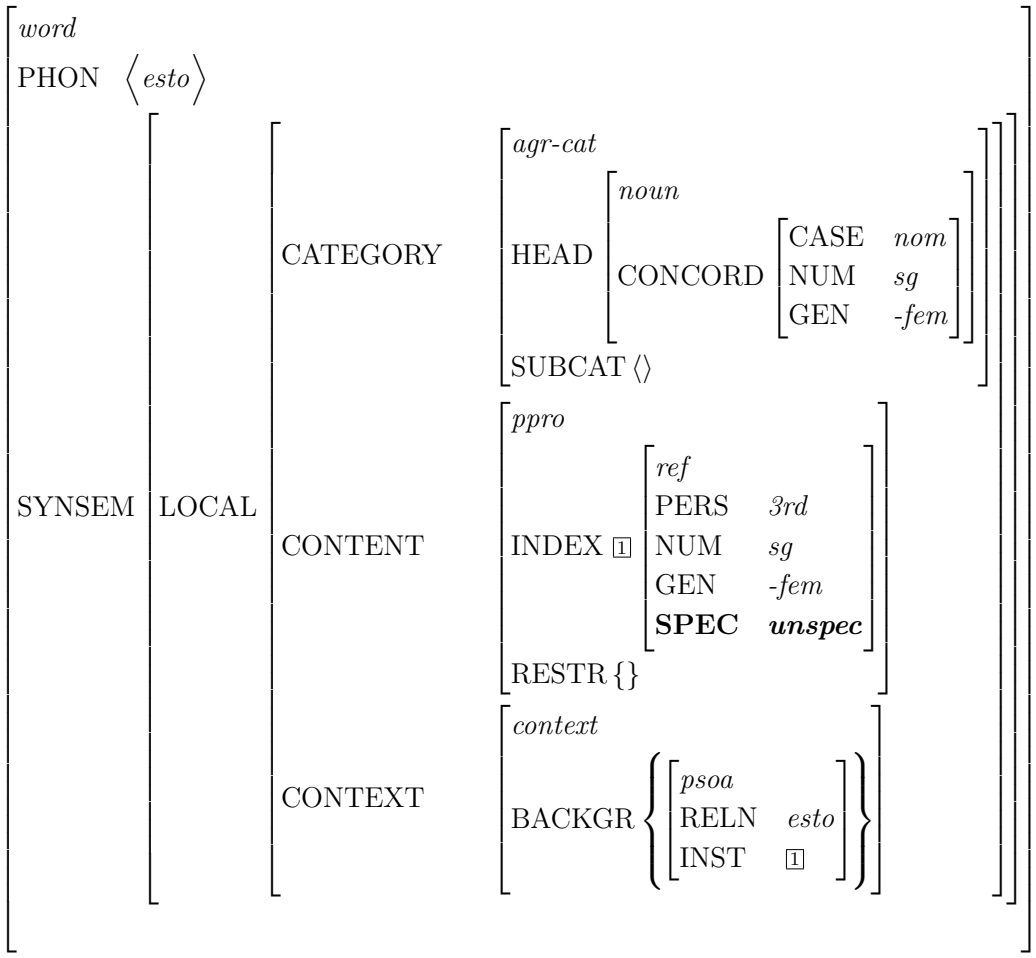

Figure 7.3: AVM diagram for Spanish 'neuter' demonstrative pronoun *esto*

over the GEN markings. This feature is similar to the mass noun agreement feature found in the INDEX of determiners, pronouns, and adjectives in Asturian (Faber, 2015).

7.1.2 Gender Assignment Strategies in L1 and L2

From the results presented here in this study as well as previous studies on gender acquisition in L1 (Hernández-Pina, 1984; Pérez-Pereira, 1991; López-Ornat, 1997; Corrêa and Name, 2003; Mariscal, 2009; Gagliardi, 2012) and L2 (Bruhn de Garavito and White, 2002; White et al., 2004; Montrul et al., 2008; Alarcón, 2011) provide evidence to suggest that in Spanish there are four different rules for gender assignment that L1 and L2 learners rely on to assign noun gender, presented below.

- **Syntactic Relations:** Agreement relations with determiners and modifiers determine the gender feature value of the noun.
- **Morphophonological Shape:** The morphophonological shape of the noun determines its gender feature value (e.g., the [-fem] value is attributed to nouns ending in *-o, -or, -aje*, etc. while the [+fem] value is attributed to nouns ending in *-a, -ción, -dad*, etc.).
- **Semantic Cues:** Biological gender of an animate (especially human) referent determines the gender value of the noun; other semantic categories also may inform gender of a noun (e.g., numbers are [-fem], letters are [+fem]).
- **Unmarked Form:** The [-fem] is the form attributed to a noun unless additional gender information from one of the above mentioned cues is provided to indicate that the noun should be [+fem].

As mentioned in Chapter 2.1, none of these cues are without exception, meaning that there is no single cue in Spanish that is 100% reliable. The more these cues point

to the same gender value on a noun, the more accurate L1 and L2 speakers are in assigning target gender. The task for both the L1 and L2 learner is to determine the productivity of each of these assignment rules, establishing which rule is most reliable and which is least reliable. Therefore, in a phrase where the syntactic and morphophonological information is not informative of gender, like that presented in example (10) in chapter 2.1 and reproduced here for convenience in (100), speakers must look to one of the alternative gender assignment rules if they have not already assigned a gender value.

(100) Tu juguete verde
Your$_{inv}$ toy green$_{inv}$
Your green toy

If a language learner does not already have a value for *juguete*, they are predicted to ascribe a [-fem] value to the GENDER attribute as syntactic relations and morphophonological shape are uninformative and there is no semantic cue present to indicate to the contrary.

7.2 Productivity

From the results presented in Chapter 6, we can ascertain that L1 Spanish speakers have established a hierarchy for nominal gender assignment such as that in (101).

(101) Syntactic Relations ⇒ Unmarked Form ⇔ Morphohonological Shape

This is to say, that the most productive rule for gender assignment to novel nouns for native Spanish speakers is that Syntactic Relations with determiners and adjectives determine the grammatical gender value of the noun. The Unmarked Form is next on the gender assignment hierarchy, which we can deduce from several of the

results from L1 Spanish speakers in the production and retention tasks. First, no significant differences are found between Transparent and Neutral Masculine (TM & NM) conditions in either the production or retention tasks. This indicates that even with a lack of overt morphophonological masculine shape, L1 Spanish speakers assign masculine gender. This is also evidenced by the results from the non-transparent feminine conditions (NF & DF), which yield no statistically significant differences between them, suggesting that the unmarked form takes precedence over the morphophonological shape. Though the morphophonological shape assignment rule is at the bottom of the gender assignment hierarchy, we still see its effects in the Transparent Feminine (TF) condition, where the productivity of the syntactic relations rule in conjunction with the morphophonological shape rule produces high accuracy rates for target gender. Additionally, L1 Spanish speakers are not as accurate in the Deceptive Masculine (DM) condition as the other masculine conditions (though accuracy rates are still high at 86.1%), indicating that the typically feminine morphophonological form (-*a*) does have some impact on gender assignment, even if all other assignment cues indicate masculine gender.

L1 BP speakers also place Syntactic Relations at the top of their hierarchy for reliable gender assignment rules. This is evidenced by the results from the production task, in which BP speakers produce target gender with novel nouns at rates well above chance in all but the Deceptive Feminine (DF) condition (which shall be addressed below). However, they rely more heavily on the morphophonological form than L1 Spanish speakers do, as evidenced by the lower target gender accuracy rates found in the Neutral Feminine (NF) and Deceptive (DM & DF) conditions. The L1 BP hierarchy for Spanish gender assignment is presented below in (102).

(102) Syntactic Relations ⇒ Morphophonological Shape ⇒ Unmarked Form

Returning, as promised, to the L1 BP results for the Deceptive Feminine (DF) conditions, L1 BP speakers have the most difficulty producing target gender in this condition because the only rule that they have that indicates that the gender value for the novel noun is [+fem] is the Syntactic Relations rule, as illustrated in Table 7.1. We see that this rule is still highly productive as target gender is produced in 37% of experimental situations.

Assignment Rule		**Gender value conclusion**
Syntactic Relations	⇒	[+fem]
Morophophonological Shape	⇒	[-fem]
Unmarked Form	⇒	[-fem]

Table 7.1: Deceptive Feminine Condition Gender Assignment Conclusions

The values for the Morphophonological Shape assignment rule and the constant [-fem] value of the Unmarked Form produce the opposite conclusion to the Syntactic Relations assignment rule. The gender assignment rule values for the Deceptive Feminine (DF) condition, presented in Table 7.1, are the same regardless of L1, what changes is the productivity of each rule. The Syntactic Relations assignment rule for L1 Spanish speakers dominates the assignment cue hierarchy with such strength that the Unmarked Form and Morphophonological Shape assignment rules have comparatively little effect. For L1 BP speakers, the Syntactic Relations rule is also highly productive, but L1 BP speakers rely on the Morphophonological Shape more than L1 Spanish speakers, resulting in a decrease in accuracy rates for Deceptive (DM & DF) conditions. L1 BP speakers also rely on the Unmarked Form rules more than L1 Spanish speakers, which is why accuracy rates are higher in the Deceptive Masculine (DM) condition than the Deceptive Feminine (DF) condition, where target accuracy rates only reach 37% for BP speakers.

Finally, L1 English speakers predictably show the greatest difference of the three experimental groups in gender assignment strategies, placing Morphophonological Shape at the top of their gender assignment hierarchy. The evidence for this conclusion stems from the production task results in this study that find no significant differences in the rates that L1 English speakers attribute masculine gender to nouns ending in *-o* or feminine gender to nouns ending in *-a*, regardless of the syntactic cues present.

(103) Morphophonological Shape ⇒ Unmarked Form ⇒ Syntactic Relations

The significant gender discrepancies found in each of the morphophonological conditions suggest that the Unmarked Form is the second most productive rule used by L1 English speakers in Spanish. Finally, the fact that L1 English speakers produce target gender on 12.5% of the Deceptive Feminine (DF) situations indicates that the Syntactic Relations rule is a gender assignment rule used by L1 English speakers, though it is not nearly as productive as the morphophonological Shape and Unmarked Form rules.

The results from the L1 English speakers are not particularly surprising, given that English speakers already have a rule in their L1 to establish natural gender with the morphophonological shape of the word (e.g., *prince/princess*, *actor/actress*, *lion/lioness*), which is present in naming conventions as well (e.g., *Robert/Roberta*, *Carl/Carla*, *Alexander/Alexandra*). Additionally, English seems to have a similar [±fem] value for semantic (INDEX) gender as well, taking into consideration that, like Spanish, English can often use the 'masculine' form of a lexical item to refer to a female referent, but not vice versa (e.g., *Angelina Jolie is an actor* is a fine statement but *Brad Pitt is an actress* is not; likewise *All men are created equal* is able to include women but *All women are created equal* cannot refer to both men and women). L1 English speakers, however, do not have morphosyntactic constraints in

their L1 regarding gender assignment; while they may have metalinguistic knowledge that Syntactic Relation rules are highly reliable for establishing gender in their L2, the results from the tasks of this study indicate that it is difficult for them to employ syntactic relations to assign gender productively in comprehension.

7.3 Optionality

As discussed in Chapter 4.5.3, syntactic optionality arises when an individual speaker employs two or more variants of a given construction that use the same lexical resources and express the same meaning (Sorace, 2000). Non-target optionality is a phenomenon that often characterizes L2 speech and much ink has been spilled attempting to form a theory of SLA that accounts for optionality in L2 speakers' IL (Sorace, 2000; Serratrice et al., 2004; Sharwood-Smith and Truscott, 2005; Sorace, 2011; Amaral and Roeper, 2014). The Multiple Grammars (MG) approach allows for numerous contradictory constraints to be available to a speaker. In this way, the optionality that is exhibited by L2 speakers in terms of gender constraints is rooted in the implementation of L1 feature constraints in their L2.

Let us take, for instance, the three exmples in (104), (105), and (106), produced by the same L1 English / L2 Spanish speaker in this study. The responses provided in (104) and (105) suggest that this participant has acquired the appropriate features and their respective constraints for noun phrases. However, the response in (106) violates Spanish gender constraints. The optional implementation of gender agreement constraints by the same speaker is precisely what is meant by non-target optionality.

(104) El empete largo
The$_{[-fem]}$ empete long$_{[-fem]}$

(105) La goltapa roja
The$_{[+fem]}$ goltapa red$_{[+fem]}$

(106) La taplina amarillo
The$_{[+fem]}$ taplina yellow$_{[-fem]}$

For L1 English speakers, the source of such optionality may stem from the difference in feature structure hierarchies between Spanish and English. Recall that in the English feature-structure hierarchy, *adjectives* are found outside the domain of the CONCORD attribute, illustrated in Figure 7.4.

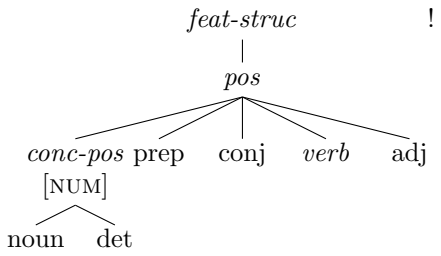

Figure 7.4: Type-hierarchy for English parts-of-speech

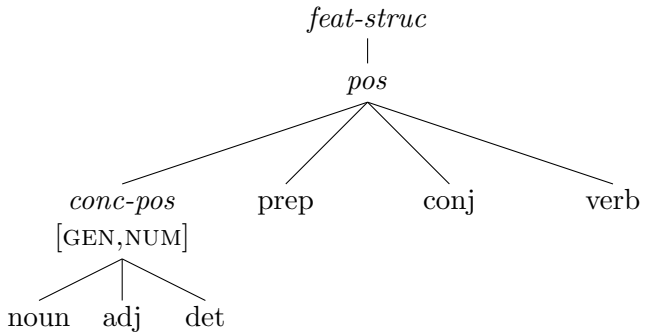

Figure 7.5: Type-hierarchy for Spanish & Portuguese parts of speech

Spanish, on the other hand, places *determiners*, *nouns*, and *adjectives* all within the domain of the CONCORD attribute, as illustrated in Figure 7.5. Optionality then arises among L2 Spanish (L1 English) speakers because in their L1, there is no possibility for morphosyntactic relations with adjectives, a possible account for the utterance in (106); however, they have also acquired the constraints of their L2,

allowing them to produce utterances like those in (104) and (105), which comply with Spanish constraints.

This account of optionality, however, does not address the cases of optionality in implementing gender agreement constraints found within the L1 BP speaker group, as illustrated by examples (107), (108), and (109), produced by the same L1 BP / L2 Spanish speaker in this study. Though there are far fewer cases such as these among the L1 BP group in comparison with the L1 English group, the theory still must be able to account for such instances.

(107) El garipe fino
The$_{[-fem]}$ garipe thin$_{[-fem]}$

(108) La volapa oscura
The$_{[+fem]}$ volapa dark$_{[+fem]}$

(109) La yoleñe pintado
The$_{[+fem]}$ yoleñe painted$_{[-fem]}$

There are two possible explanations for the data provided above. The first explanation is lexical. That is to say, there is an error at the lexical level and the participant has represented the adjective in (109) as invariable like *feliz* or *macho*. The second explanation is that, as the novel noun has only just been presented to the participant, the gender of the new item is in the process of being assigned. In this way, the participant establishes a [+fem] gender value for the determiner, which agrees with the gender value of the syntactic cues provided in the story. Then, as the participant recalls the novel noun, the lack of overt transparent morphophonology along with the influence of the unmarked gender value trigger the [-fem] value, which is then employed on the adjective, resulting in the utterance presented in (109). This second explanation is also plausible for the three cases of gender constraint violations found among L1 Spanish speakers, produced below in (110), (111), and (112).

(110) Una taplino amarillo
$A_{[+fem]}$ taplino $yellow_{[-fem]}$

(111) Una coifeto amarillo
$A_{[+fem]}$ coifeto $yellow_{[-fem]}$

(112) Un implufa moderna
$A_{[-fem]}$ implufa $modern_{[+fem]}$

This second analysis is particularly appealing considering that the three instances of gender constrain violations among L1 Spanish speakers occurred in Deceptive morphophonological conditions in which the determiner illustrates target gender but the gender of the adjective is consistent with the canonical gender of the novel noun ending.

7.4 Grammatical Conservativism and Lack Thereof

The results from the three tasks employed in this dissertation reinforce conclusions from previous studies that suggest a production-comprehension asymmetry (Snyder, 2007; Pickering and Garrod, 2013; Amaral and Roeper, 2014; Turrero-García, 2016). Amaral and Roeper (2014) assert that this asymmetry provides evidence for a Multiple Grammars approach to language, arguing that while learners are conservative in their production, choosing to employ grammatical rules in which they feel more confident and avoiding responses when they feel unsure, in comprehension they allow for a broad range of interpretations that do appear in their production of the target language. This is to say, that in comprehension, learners (either L1, L2, or Ln) may have multiple interpretations for a sequence that can be interpreted by different sub-grammar rules.

In the results from production task, presented in Chapter 6.1, we see that L1 Spanish speakers do not use avoidance as a strategy, while we do find instances

of avoidance among L2 speakers. When the response depends on interpretation of features and memory, L2 speakers were more likely than native speakers to avoid responding (with responses such as *No lo sé* 'I don't know' or *La cosa...* 'The thing...'). L1 speakers, on the other hand, have more cognitive resources available to them as they do not have to put forth the same degree of effort to comprehend and retain the information presented in the situations and then answer the follow-up question. However, in the retention study we see the opposite trend where L1 Spanish speakers are roughly twice as likely to elect an avoidance strategy than L1 BP speakers (L1 Spanish avoidance responses: 139; L1 BP avoidance responses: 68) and over seven times as likely to employ an avoidance strategy than L1 English speakers (L1 English avoidance responses: 18). The results from the retention study indicate that presenting six items twice was not sufficient for speakers to retain target gender; nevertheless, these results are quite informative. The high instance of avoidance responses among L1 Spanish speakers suggest that they are aware of the fact that they do not know the grammatical gender of the item and therefore, they attempt to avoid its use as much as possible. L1 BP speakers are also aware that they do not know the grammatical gender of the item and, therefore, may also attempt avoidance strategies; although, the nature of being an L2 speaker means that they do not have the same linguistic and cognitive resources available to employ avoidance strategies as adeptly as L1 Spanish speakers.

The retention task results for L1 English speakers show very few instances of avoidance (only one to four instances per condition). There are two reasons that explain this result. First, like L1 BP speakers, L1 English speakers do not possess the same linguistic and cognitive resources to effectively avoid employing grammatical gender in their responses than L1 Spanish speakers and even less so than their L2 (L1 BP) counterparts, whose native language typology provides them with an advantage compared to L1 English speakers, assuming that L1 BP speakers have gender

avoidance strategies that they employ in Portuguese that can be easily transferred to Spanish. Second, as the results from the production study indicate that L1 English speakers assign noun gender in Spanish based largely on morphophonological shape of the word when it is informative and using the unmarked form when it is not, L1 English speakers have the information they need from the word itself to employ their two most productive assignment strategies in the retention task and therefore making an avoidance strategy seemingly unnecessary.

The results from the SPR task suggest that while L1 English speakers rely on morphophonological shape and the unmarked form to assign grammatical gender in production, these cues do not have an effect on sentence processing. The L1 English constraint for inanimate anaphoric referents, similar to the null nominal constructions from the SPR experiment, does not have a GENDER feature. Additionally, Phillips et al. (2011) suggest that in processing reflexives, person, number, and gender features play no role in the search for an antecedent, suggesting that the structural cues are the only cues necessary to retrieve the proper antecedent. Therefore, L1 English speakers can read through the experimental sentences without processing the gender of the novel noun nor the gender of the null nominal. L1 Spanish and BP speakers, on the other hand, do show some processing effects for the gender/morphology manipulation. For these groups, we see a processing lag in the same conditions that yeilded the lowest accuracy rates in the production task.

7.5 Future Directions

The ideas and results presented in this dissertation have only scratched the surface of how we can begin to conceive of a MG approach to SLA within a constraint-based framework. The larger goal in this approach is to find a theory of representation that

not only can account for the L2 acquisition process but also for L1 acquisition, L3 representation, simultaneous bilingualism, monolingual grammar and all other stages and manifestations of linguistic knowledge and ability. In this section, some of the issues that have arisen from the present work and possible directions to investigate MG and feature (re-)assembly are discussed.

7.5.1 Experimental Improvements

To begin, the current work could benefit from investigating a larger subject pool. Due to the number of independent variables and the nature of the tasks presented, each participant is presented with only three items for each condition, as more than three items would have made the experimental tasks gruelingly long. As the resources for this study were limited, participants had to be tested individually, resulting in a lengthy data collection process. Time and budgetary constraints were a principle limitation in conducting this research. As such, increasing the number of participants that take part in each task yields data that allows for a more detailed analysis.

This research would also benefit from investigating different levels of L2 speakers so that we might better understand the process of acquisition for learners with different L1s. The limitations mentioned in the previous paragraph were also a limitation in regard to testing different levels of speakers. The resources available were simply insufficient to expand the research to include L2 learners at different levels of target language competence. In the future, this research should include not only various levels of L2 learners, but additionally extend the investigation to L2 learners with different L1 typologies. This research investigates learners of L1 BP, which is nearly identical to Spanish in terms of grammatical gender and L1 English, which lacks a GENDER feature for its CONCORD attribute. In the future, this research would benefit from investigating speakers with an L1 that has a GENDER feature that does

not have the same feature values or type-hierarchy structure as Spanish, such as German or Russian, which have three values for grammatical gender and are employed in different domains. Additionally, it would be beneficial to test speakers of other L1s that do not have grammatical gender that have a different language typology to English, such as Japanese or Korean to better understand how features are reassembled in SLA.

It turns out that the results from the retention experiment do not examine retention, but rather gender assignment to bare nouns in Spanish by L1 and L2 speakers. Though these results still provide us with useful information about grammatical gender assignment, they do not answer our questions about gender retention and L1, as presented in Chapter 5.1. In the future, the experiment could be manipulated so that the retention task is a separate experiment in which participants are presented with a novel noun several times in context, then given a distractor task before eliciting the novel noun again. As it seems that presenting six novel words before the retention task overwhelmed the participants' memories, presenting the novel nouns one-at-a-time with an intervening distractor task should alleviate the memory overload and allow us to truly investigate gender retention rather than gender assignment to bare nouns. Additionally, the number of times that the novel nouns are presented could be manipulated.

To better investigate the processing aspect of this research, the implementation of an eye-tracking study rather than a SPR task can capture the nuances of processing and comprehension. The major drawback with a SPR study, particularly when dealing with L2 speakers, is that participants have no ability to look back onto previous text that they have read. Tracking participant regressions can help to form a more complete analysis of the representation behind cognitive processes involved in gender assignment and retrieval. This can also help us to view differences between

L1 and L2 speakers as well as differences between L2 speakers who have different L1s or have attained different levels of proficiency in their L2.

Lastly, the experimental tasks here focus purely on the feature of grammatical gender as a linguistic agreement feature without influence from semantic (*biological*) gender of animate referents. However, this is not to say that biological gender does not have an important role; in fact, it may be that quite the opposite is true. Carroll (1999) has asserted that in L2 French, for example, anglophones readily identify the GENDER value with the concept of sex category, and there have been similar findings for anglophones in L2 Spanish (Alarcón, 2009). As there is a high correlation between grammatical and semantic gender, in addition to semantic gender existing in English, it is highly probable that L2 learners rely most heavily on this feature to inform the GENDER value both for the CONCORD and INDEX attributes. The next step in this specific line of research should include the role of biological gender to better understand how biological gender can facilitate grammatical gender assignment in L1 and L2 speakers.

7.5.2 Production-Comprehension Asymmetry

To further investigate how productivity of linguistic constraints affects L2 acquisition, this author suggests that the NUMBER feature be investigated along side the GENDER feature. Additionally, incorporating ungrammatical sentences into the processing study can give us a better idea of how English speakers are interpreting these sentences. For example, if the analysis presented here that L1 English speakers are able to read Spanish sentences using their English grammar that does not have GENDER as a feature of CONCORD or INDEX is correct, then we expect that it does not matter whether the sentence is grammatical or ungrammatical in terms of gender

agreement. Therefore, reading times for sentences such as that in (113) and (114) should not differ.

(113) * Miguel quiere un fireno, compra la roja que está en
Miguel wants $a_{[-fem]}$ $fireno_{[-fem]}$, buys $the_{[+fem]}$ $red_{[+fem]}$ that is in
la tienda.
the store
Miguel wants a fireno, he buys the red one in the store.

(114) Miguel quiere una firena, compra la roja que está en
Miguel wants $a_{[+fem]}$ $firena_{[+fem]}$, buys $the_{[+fem]}$ $red_{[+fem]}$ that is in
la tienda.
the store
Miguel wants a firena, he buys the red one in the store.

However, reading times for L1 Spanish and L1 BP speakers should be much longer when the null nominal has an incompatible gender value, as in (113). When it comes to number, on the other hand, L1 English speakers should react to the ungrammatical sentences in the same way as the L1 Spanish and L1 BP speakers as all three have NUMBER as a feature of CONCORD in their L1.

7.5.3 Further Investigations of Productivity

To further investigate the effect of linguistic productivity, it would be prudent to examine recursive constructions, specifically compare recursive forms that are productive in the L1, that exist but are not productive in the L1, and that do not exist at all in the L1. Possessive recursive structures are ideal for testing productivity as English has two syntactic structures that can be used to express possession and can be used recursively: the Saxon Genitive (also known as possessive *'s*), illustrated in example (115) or prepositional possessive constructions, such as that in example (116). Spanish, on the other hand, only has the prepositional option in forming recursive possessive constructions, illustrated in (117).

(115) Amelia's neighbor's brother's dog has fleas.

(116) The dog of the brother of the neighbor of Amelia has fleas.

(117) El perro del hermano de la vecina de Amelia tiene pulgas.
The dog of.the brother of the neighbor of Amelia has fleas
Amelia's neighbor's brother's dog has fleas.

Any native speaker of English will quickly note that example (115) sounds much more natural than its prepositional possessive counterpart in (116) and is likely much easier to parse. In order to understand how productivity of certain constraints affect comprehension and acquisition, a study could be designed to test monolingual English speakers' interpretation of various phrases such as those in (115) and (116) and compare those results to L2 English / L1 Spanish speakers' results in the same task. A similar task could be designed for Spanish (obviously with only the prepositional possessive construction as that is the only one allowable) in which L1 Spanish and L2 Spanish / L1 English speakers are tested on their ability to parse possessive constructions in Spanish.

The prediction for such an experiment would be that monolingual English speakers show more difficulty in interpreting the prepositional possessives than the possessive *'s*; however, it should be easier for L2 Spanish / L1 English speakers to process these prepositional constructions than for L1 Spanish speakers to process the recursive possessive *'s* because this construction exists in their L1 (English) but is not highly productive, whereas the possessive *'s* construction does not exist at all in Spanish. Finally, we should find an inverse result for L2 English / L1 Spanish speakers compared to L1 English speakers when it comes to interpreting possessive constructions in English. The productivity of the Spanish prepositional possessive construction should facilitate speakers' ability to interpret these sentences, while the non-existence of the possessive *'s* construction in Spanish causes these constructions to

be very difficult to interpret, even for L2 speakers with a highly advanced proficiency in English.

7.5.4 Extending MG to Heritage Speakers

Heritage language speakers are far from forming a homogeneous group as far as their language abilities are concerned; their linguistic proficiency may range from heritage language-dominant bilinguals to passive bilinguals with limited control of their heritage language (Blake and Zyzik, 2003; Schreffler, 2007). This wide range of linguistic ability can provide us with insight to answer the question: How does language dominance affect performance? Specifically, compare low-level, mid-level, and highly proficient Heritage speakers with L1 and L2 Spanish speakers to better understand how the relative productivity of linguistic constraints in each bilingual affect the speaker's production and comprehension of said constraints. This requires a rethinking of the experimental design, especially for the processing task, as heritage speakers often have no literacy training in their Heritage language (Valdés, 2005).

Heritage speakers are also a good population to study in order to investigate productivity. The study on possessives described in the previous section would be particularly enlightening with heritage speakers as one of the subject groups. Studying Heritage Speakers in this domain would allow us to see if productivity in one language is easily transferred to the other language (i.e., are linguistic constraints language-dependent?), which can shed light on the question proposed by Lardiere (2009b, p. 212): 'to what extent are features dissociable from the lexical items they comprise in both native and target languages?' Are Heritage Speakers better able to interpret English sentences such as that in (116) due to the productivity of the Spanish possessive construction? If so, by how much? How do Heritage speaker results compare to L2 English / L1 Spanish results? Comparing L1 and L2 speakers

with Heritage speakers can help us to answer these questions and better understand how linguistic productivity and language dominance affect comprehension and interpretation, which should ultimately provide us with a greater understanding of the production-comprehension asymmetry.

7.6 Conclusions

The overarching goal in SLA, and in fact the study of linguistic theory more generally, is to find a framework that can account for the wide variability of natural language and yields accurate predicting power for its use and acquisition path. Considering that the 'deductive consequences' promised by the clustering of features within the Principles and Parameters framework (Chomsky, 1981a,b) have remained largely unfulfilled (Carroll, 2001; Lardiere, 2009b), it seems appropriate to investigate alternative approaches to SLA. Lardiere (2008, 2009a,b) advocates for a theory of feature assembly as a plausible alternative to parameters as a theory of second language acquisition. However, other SLA researchers such as Travis (2008), Montrul and Yoon (2009), Slabakova (2009), White (2009), and Liceras (2009) have brought up concerns about Lardiere's rejection of parameters, fearing that without the structure they provide, a theory of feature assembly is far too 'free', leading to a proliferation of possible combinations with no mechanism to constrain them and ultimately little predictive power. In response to Lardiere's (2009) proposal, Carroll (2009) suggests implementing a constraint-based theory like HPSG as a framework in which to further investigate feature (re)assembly as a theory of SLA, which addresses many of the concerns regarding the abandonment of parameters theory (Travis, 2008; Liceras, 2009; Montrul and Yoon, 2009; Slabakova, 2009; White, 2009). The current work investigates the acquisition and assignment of grammatical gender in Spanish by L1 and L2 speakers incorporating the proposals put forth by Lardiere (2008, 2009a,b)

and Carroll (2009) for feature (re)assembly as the theory formalized using HPSG, viewed through the lens of Multiple Grammars (Roeper, 1999, 2011; Amaral and Roeper, 2014).

Grammatical gender is a complex phenomenon that not only requires appropriate selection on different linguistic elements, but also involves distinct constraints over how these elements are unified. Additionally, language learners must acquire the various rules for assigning grammatical gender to a novel noun and the relative strength of each of these cues; that is to say, speakers must determine which assignment cues take precedence in a case of conflicting assignment rules. The data reported in this study allow us to see how L1 and L2 speakers utilize different gender cues to assign gender to novel nouns and how the feature structure of their L1 affects their production and processing of grammatical gender constraints in Spanish.

APPENDICES

APPENDIX A

PROFICIENCY ASSESSMENT EXAM

Instrucciones:

En el texto a continuación, se sustituyen algunas palabras con espacios, numerados del 1 al 20. Primero, lee el texto con el fin de entenderlo. Luego, léelo de nuevo y elige la palabra correcta de la hoja de respuestas para cada espacio. Marca tus respuestas en la hoja de respuestas.

El sueño de Joan Miró

Hoy se inaugura en Palma de Mallorca la Fundación Joan Miró, en el mismo lugar en donde el artista vivió sus últimos treinta y cinco años. El sueño de Joan Miró se ha _____ (1). Los fondos donados a la ciudad por el pintor y su esposa en 1981 permitieron que el sueño se _____ (2); más tarde, en 1986, el Ayuntamiento de Palma de Mallorca decidió _____ (3) al arquitecto Rafael Moneo un edificio que _____ (4) a la vez como sede de la entidad y como museo moderno. El proyecto ha tenido que _____ (5) múltiples obstáculos de carácter administrativo.

Miró, coincidiendo _____ (6) los deseos de toda su familia, quiso que su obra no quedara expuesta en ampulosos panteones de arte o en _____ (7) de coleccionistas acaudalados; por ello, en 1981, creó la fundación mallorquina. Y cuando estaba _____ (8) punto de morir, donó terrenos y edificios, así como las obras de arte que en ellos _____ (9).

El edificio que ha construido Rafael Moneo se enmarca en _____ (10) se denomina "Territorio Miró", espacio en el que se han _____ (11) de situar los distintos edificios que constituyen la herencia del pintor.

El acceso a los mismos quedará _____ (12) para evitar el deterioro de las obras. Por otra parte, se _____ (13), en los talleres de grabado y litografía, cursos _____ (14) las distintas técnicas de estampación. Estos talleres también se cederán periódicamente a _____ (15) artistas contemporáneos, _____ (16) se busca que el "Territorio Miró" _____ (17) un centro vivo de creación y difusión del arte a todos los niveles.

La entrada costará 500 pesetas y las previsiones dadas a conocer ayer aspiran _____ (18) que el centro acoja a unos 150.000 visitantes al año. Los responsables esperan que la institución funcione a _____ (19) rendimiento a principios de la _____ (20) semana, si bien el catálogo completo de las obras de la Fundación Pilar y Joan Miró no estará listo hasta dentro de dos años.

Hoja de Respuestas:

1. a. cumplido b. completado c. terminado

2. a. inició b. iniciara c. iniciaba

3. a. encargar b. pedir c. mandar

4. a. hubiera servido b. haya servido c. sirviera

5. a. superar b. enfrentarse c. acabar

6. a. por b. en c. con

7. a. voluntad b. poder c. favor

8. a. al b. en c. a

9. a. habría b. había c. hubo

10. a. que b. el que c. lo que

11. a. pretendido b. tratado c. intentado

12. a. disminuido b. escaso c. restringido

13. a. darán b. enseñaran c. dirán

14. a. sobre b. en c. para

15. a. distintas b. iguales c. varios

16. a. ya b. así c. para

17. a. será b. sea c. es

18. a. a b. de c. para

19. a. completado b. pleno c. entero

20. a. siguiente b. próxima c. pasada

¿Están bien formadas?

Por favor, marca con una "X" si la oración es correcta o incorrecta. Si está mal, por favor forma la oración correcta.

21. Saca las figuras del estante y límpialas.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

22. Los estudiantes nuevos debe leer el reglamento académico del centro.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

23. Se negaron a embarcarse porque tenían miedo de los naufragios.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

24. Tuvo que guardar cama por estar enfermo.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

25. Al romper los anteojos, Juan se asustó porque no podía ver sin ellas.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

26. ¡Cuidado con ese cuchillo o vas a cortarse el dedo!

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

27. Sus amigos pudieron haberlo salvado pero lo dejaron perecer.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

28. Cuando un mendigo me pide una moneda siempre se lo doy.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

29. Para saber la hora, don Juan miró el despertador.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

30. ¿Dónde estará mi cartera? Lo dejé aquí mismo hace poco y parece que el necio de mi hermano ha vuelto a escondérmela.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

31. Compró ejemplares de todos los diarios pero en vano; no halló la noticia que deseaba.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

32. Mis hermanas les gusta el chocolate y lo comen todos los días.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

33. La familia van al parque todos los días para dar un paseo.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

34. Nos dijo mamá que era hora de comer y por eso tomamos asiento.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

35. Mi prima y yo vamos hacer una tarta para el cumpleaños de nuestra abuela.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

36. Ayer los niños vieron una película que le encantan, “El Rey León”.

☐ Correcto ☐ Incorrecto La forma correcta es:

_____

37. Pon el mesa en la esquina, así tenemos más espacio.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

38. Los niños del pueblo de al lado siempre pasa el día nadando en el río.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

39. ¡Pobrecita! Está resfriada y no puede salir de casa.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

40. Quiero un móvil nuevo pero no puedo comprarla porque me falta dinero.

☐ Correcto

☐ Incorrecto

La forma correcta es:

_____

APPENDIX B

PRODUCTION TASK INSTRUCTIONS

Instrucciones

Gracias por participar en este experimento.

Esta tarea investiga la memoria como afecta la memoria en la primera y segunda lengua.

Vas a escuchar información sobre la ubicación de dos objetos inventados, luego hay una cuenta atrás de 3 a 1. Entonces vas a escuchar una pregunta sobre la ubicación de uno de los objetos.

Responde a la pregunta con el objeto adecuado.

APPENDIX C

PRODUCTION EXPERIMENTAL ITEMS

Situación 1:

Pilar dejó un(a) taplino/a/e rojo/a en el sofá y luego dejó un(a) taplino/a/e amarillo/a en el suelo. Se usan para mantener el libro abierto. Fíjate en su ubicación...

¿Qué estaba en el suelo?

Situación 2:

Mi amiga Mirna tiene un(a) yoleño/a/e pintado/a en la mesa y tiene un(a) yoleño/a/e inacabado/a en la cocina. Sirven como decoración. Presta atención...

¿Qué estaba en la mesa?

Situación 3:

Marcelino es granjero, hoy dejó un(a) empeto/a/e largo/a en el camino y después dejó un(a) empeto/a/e corto/a bajo un árbol. Se usan para cosechar las nueces de macadamia. Prepárate...

¿Qué dejó en el camino?

Situación 4:

Juan compró un(a) suntefo/a/e rojo/a que está en su cama y también un(a) suntefo/a/e negro/a que está en su escritorio. Se usan en los bailes tradicionales de Mozambique. Fíjate...

¿Qué estaba en el escritorio?

Situación 5:

Marco tiene un(a) coifeto/a/e amarillo/a que está al lado de la nevera y un(a) coifeto/a/e rojo/a que está al lado del fregadero. Se usan para cortar los plátanos con poco esfuerzo. Presta atención...

¿Qué estaba al lado de la nevera?

Situación 6:

Javier fue a Egipto y se compró un(a) davino/a/e dorado/a que colgó sobre su computadora y un(a) davino/a/e negro/a que está en la estantería. Le recuerdan a su viaje. Fíjate...

¿Qué estaba en la estantería?

Situación 7:

Adela está arreglando una nueva exposición en el museo. Pone un(a) implufo/a/e obsoleto/a en el estante más alto y un(a) implufo/a/e moderno/a en el estante más bajo. Se usan para crear bolsa de papel con base plana. Fíjate...

¿Qué estaba en el estante más bajo?

Situación 8:

Ricardo siempre va estresado, por eso, se compró un(a) efarno/a/e metálico que está en su mesilla y un(a) efarno/a/e plástico/a que guarda en el baño. Se lleva en la cabeza para aliviar el estrés. Presta atención...

¿Qué se guarda en el baño?

Situación 9:

Penelope es experta en robótica. Tiene un(a) figoto/a/e morado/a en la mesa y un(a) figoto/a/e amarillo en el estante. Está decidiendo cuál usar en su próximo proyecto. Presta atención...

¿Qué estaba en la mesa?

Situación 10:

Javier está en la playa, llevó un(a) goltapo/a/e rojo/a que dejó en la arena y un(a) goltapo/a/e blanco/a que dejó en la silla. Se usan para guardar sus objetos de valor. Prepárate...

¿Qué dejó en la arena?

Situación 11:

Silvia produce queso, tiene un(a) jocono/a/e cuadrado/a que está en la mesa y un(a) jocono/a/e redondo/a que está en el estante. Se usan para cortar el queso. Fíjate...

¿Qué estaba en el estante?

Situación 12:

En su cuarto de baño, Beatriz tiene un(a) narapo/a/e amarillo/a en la bañera y un(a) narapo/a/e blanco/a en la alfombra. Se usan para bañar a su bebé. Presta atención...

¿Qué tenía en la bañera?

Situación 13:

Irene es artista. Usa un(a) garipo/a/e fino/a que está al lado de su obra y un(a) garipo/a/e grueso/a que está en la mesa al lado. Se dan textura a sus esculturas. Presta atención...

¿Qué estaba al lado de la obra?

Situación 14:

Pablo es muy limpio, por eso tiene un(a) fulipo/a/e rojo/a en la cómoda y un(a) fulipo/a/e amarillo/a en el escritorio. Se usan para acumular polvo del cuarto.

Fíjate...

¿Qué estaba en el escritorio?

Situación 15:

Diego puso un(a) quinabro/a/e morado/a sobre la puerta y luego puso un(a) quinabro/a/e claro/a al lado de la ventana. Son para atrapar las moscas que entran. Prepárate...

¿Qué puso al lado de la ventana?

Situación 16:

Julia trabajaba en el jardín hoy y dejó un(a) raganto/a/e largo/a al lado de la fuente y un(a) raganto/a/e corto/a en el banco. Ahora no recuerda dónde están. Prepárate...

¿Qué dejó al lado de la fuente?

Situación 17:

Rodrigo está acampando, tiene un(a) urelno/a/e rojo/a al lado de la tienda y un(a) urelno amarillo/a en la mesa. Se usan para cargar sus aparatos. Prepárate...

¿Qué tenía en la mesa?

Situación 18:

Miguel jugaba afuera y dejó un(a) volapo/a/e rojo/a al lado de los columpios y un(a) volapo/a/e morado/a en el arenero. Ahora no sabe dónde están. Fíjate...

¿Qué dejó en el arenero?

APPENDIX D

LINGUISTIC BACKGROUND QUESTIONNAIRE

Toda la información provista es confidencial. Puede usar el otro lado de esta hoja si lo necesita.

Edad: _____ Sexo: ☐ masculino ☐ femenino Número de participante: _____

1. País de origen: _____

2. Profesión: _____

3. ¿Es el castellano su lengua nativa? SÍ / NO a. Si contesta "no", ¿cuál es su lengua nativa? _____

4. ¿Es castellano su lengua dominante? SÍ / NO a. Si contesta "no", ¿cuál es su lengua dominante? _____

5. ¿Qué idioma(s) habla su mamá? _____

6. ¿Su papá? _____

7. ¿Habla algún idioma aparte del castellano con la familia? SÍ / NO a. Si contesta "sí", ¿qué idiomas habla y con quién? _____

8. ¿Qué otra(s) lengua(s) ha estudiado? _____

9. ¿Cuántos años hace que estudia la(s) lengua(s) que mencionó en la número 8? _____

10. Para cada lengua adicional, indique el contexto en que la aprendió (colegio, universidad, los padres, estudios en el extranjero, etc.) _____

11. ¿Cuál es su nivel en cada lengua que ha estudiado? (Use la escala a continuación para evaluarse): **1** Lo hablo con fluidez. **2** Hablo bien sobre una amplia variedad de temas **3** Puedo hablar sobre temas que me son familiares. **4** Puedo entender y usar frases básicas. **5** Lo estudié, pero no lo hablo. _____

12. ¿Practica esa(s) lengua(s) fuera de clase? SÍ / NO a. Si contesta "sí", ¿cuánto y con quién la(s) practica? _____

13. ¿Ha vivido alguna vez en un país aparte de su país nativo? SÍ / NO a. Si contesta "sí", ¿en qué país(es) vivió? _____

Educación (marque todas las casillas que correspondan, indique a la derecha si usó otro idioma):

La educación básica ☐ en español ☐ en otro idioma

La escuela secundaria ☐ en español ☐ en otro idioma

La universidad ☐ en español ☐ en otro idioma

Los estudios pos-graduados ☐ en español ☐ en otro idioma

Lugar (marque las casillas que correspondan e indique a la derecha si no ocurrió en los EEUU):

¿Dónde asistió a la escuela primaria? ☐ en los EEUU ☐ en otro país

¿Dónde asistió a la escuela secundaria? ☐ en los EEUU ☐ en otro país

¿Dónde asistió a la universidad? ☐ en los EEUU ☐ en otro país

¡Gracias por su participación!

Por favor, revise las respuestas para asegurarse que contestó todas las preguntas.

APPENDIX E

PROCESSING EXPERIMENTAL ITEMS

NP	**verb**	**NONCE**	**verb**	**NULL NOM**	**spill-over**	**wrap-up**
Miguel	quiere	un duriño,	prefiere	el rojo	que está	en la mesa.
María	compra	un taliso,	escoge	el negro	que se vende	en el quiosco.
Guillermo	tiene	un fireno,	compró	el barato	de la tienda	en la esquina.
Emilia	quiere	un pifaro,	admira	el bonito	que es de	su hermana.
Rodrigo	alquila	un catelo,	elige	el rápido	para ir	a la playa.
Cristina	busca	un tiboro,	desea	el cuadrado	que miró	en casa de Ana.
Beatriz	arruinó	un caposo,	rompió	el pequeño	que tenía	en el escritorio.
Alfonso	construyó	un danipo,	hizo	el alto	que está	en el jardín.
Pablo	mereció	un solibo,	recibió	el prestigioso	de todos	sus colegas.
Graciela	quería	un guiceno,	señaló	el amarillo	que estaba	en el estante.
Felipe	pide	un burebo,	adora	el sueco	que se vende	en el centro.
Andrea	encontró	un janodo,	fue	el peludo	que perdió	la semana pasada.
Amalia	compró	un milipo,	escogió	el básico	que encontró	en oferta.
Araceli	destruyó	un lodeno,	fue	el asqueroso	que le dieron	sus suegros.
Jorge	llevó	un nepato,	mostró	el exquisito	en la sala	de exposiciones.
Diego	cocinó	un linolo,	sirvió	el sabroso	de postre	para la cena.
Rafael	desea	un ratabo,	comprará	el morado	cuando tenga	dinero suficiente.
Irene	obtuvo	un jalerno,	fue	el italiano	que probó	en el mercado.

Table A.1: Experimental Items for SPR Task

APPENDIX F

PROCESSING EXPERIMENTAL FILLERS

Marta practica el taquifilo todos los días, juega muy bien.

Daniel cuaticó la pizarra en la case de biología la semana pasada.

Rubén parece amable pero siempre tafinta con su madre.

Los coches japoneses gastan más gasolina que los timbinos.

Los soldados salvajes destruyeron la ciudad después de invadir los galadenios.

El viaje fue largo y duro pero al final tangramos.

Los gemelos flabaron a su madre cuando les mandó que limpiaran la habitación.

Los estudiantes se quejan cuando la profesora les vangala la tarea el viernes.

Ayer robamos la gran estatua que se sitúa cerca de la copsalta.

Nosotras falagamos las sillas para que todos puedan sentarse.

La policía detuvo al corchongo malvado porque robó la joyería.

Las niñas hablaban del chico guapo cuando llegaron a los deretechanos.

El mes que viene mis padres me comprarán un nuevo ragoleno para la Navidad.

Critoidamos las imágenes de la internet para usar en nuestra campaña.

Gardantí tres veces antes de entrar a la oficina de la jefa.

Tarpaltí el ensayo para mi clase de filosofía hasta el último momento.

Borchearemos el viaje tan pronto como tengamos dinero.

Mañana le jalagaremos a nuestra prima porque será su cumpleaños.

Los estudiantes cartelagan una tarta, se comieron toda en un santiamén.

A los hermanos les palenfa el cine, por eso ven las películas nuevas.

A Ramona le sartagan las matemáticas, siempre estudia cuando puede.

A Félix le colimean los quehaceres, ahora su madre está muy enfadada.

A Violeta le denquean las bromas de su hermano, está harta de ellas.

A las artistas les hampica la naturaleza, pasan las mañanas al lado del lago.

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